First Copy

# The TOOL ENGINEER

## In This Issue:

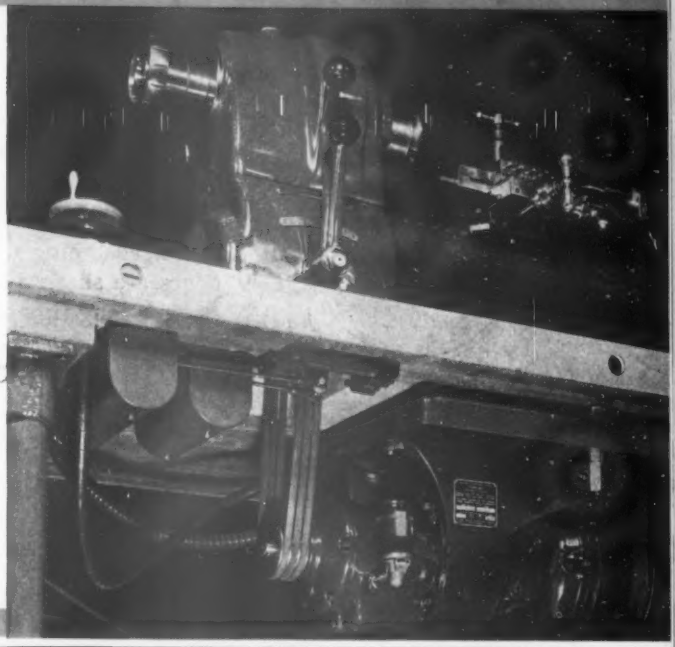



**HARDINGE**

The Modern Bench Lathe with Modern Driving Unit

THE UNUSUAL STORY of a Two-Speed Motor with Variable-Speed Transitorq

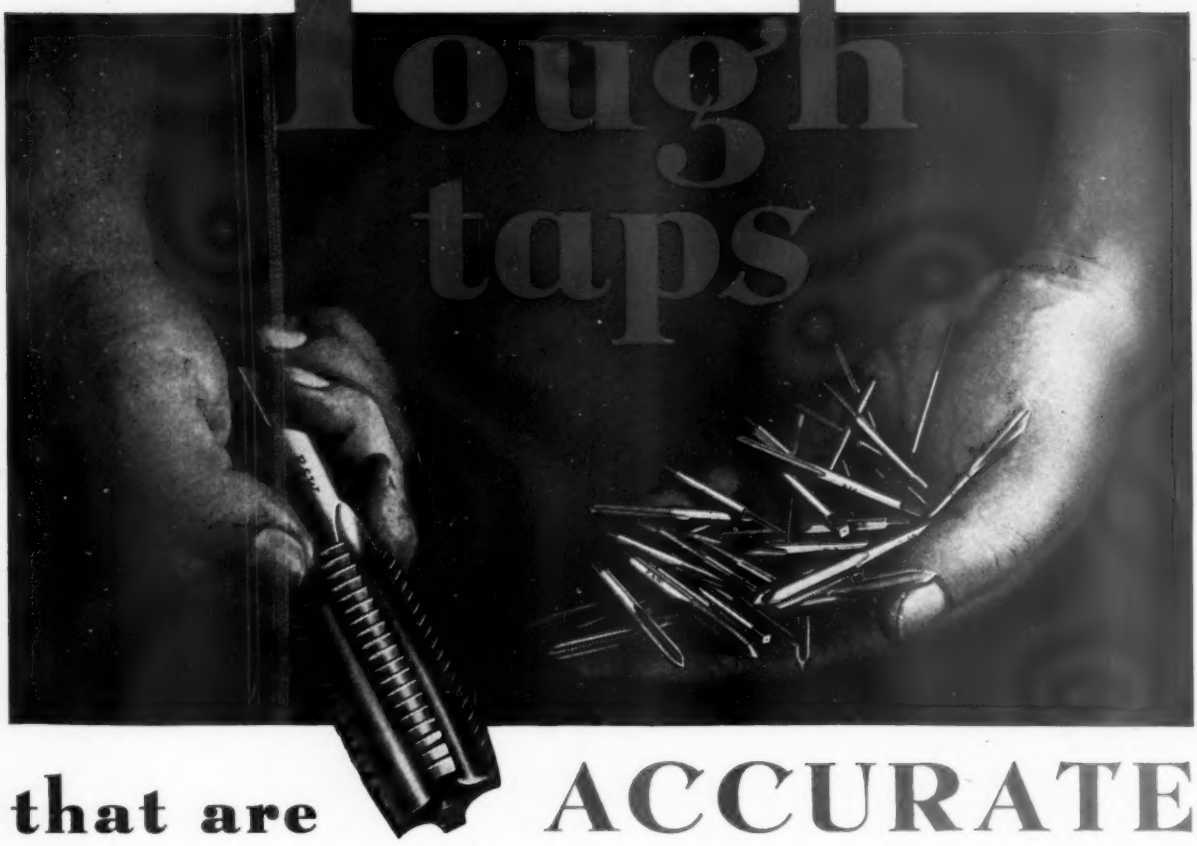




OCTOBER
1937

Official Publication of the
AMERICAN SOCIETY
OF TOOL ENGINEERS

# Tough taps



## that are ACCURATE

If you could look inside a Pratt & Whitney tap you would see its excellent tough structure, metallurgically correct to resist rough treatment. That is why a Pratt & Whitney tap does not break easily, and keeps going where others fail. It cuts smoothly because its tooth edges are sharp and hard, with just the right relief. Those edges stay sharp a long time, and cut more accurate threads than you would think possible.

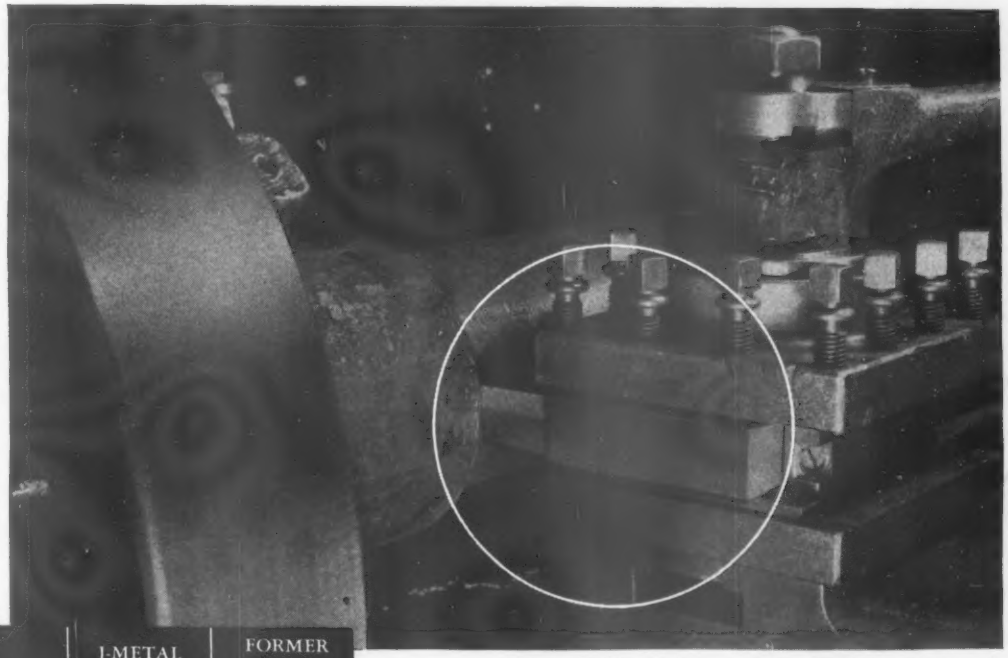
The reasons for such excellent performance lie in careful steel selection and heat treatment. A P&W tap may look like any other, but it has a hard, tough accuracy that makes it outstanding. Its fine characteristics are produced by experts.

The real test of any tap is its initial cost divided by the number of holes it will tap accurately. That cost per tapped hole is the only true index of its worth. And with Pratt & Whitney taps, that cost per hole will be low — so low that you will wonder at it.

*Pratt & Whitney taps include all kinds, and all sizes, small and large. Most are carried in stock for quick delivery. For complete details write to Pratt & Whitney, Division Niles-Bement-Pond Co., Hartford, Conn.*

# PRATT & WHITNEY

# Haynes Stellite J-METAL Machines Tough Steel Forging



Haynes Stellite J-Metal turning a forged steel piston rod.

| | J-METAL | FORMER TOOLS |
|---|---|---|
| Surface speed, feet per minute | 70 | 51 |
| Feed, inches per revolution | 0.020 | 0.020 |
| Depth of cut, inches | 3/32–1/4 | 3/32–1/4 |
| Pieces per grind | 4 | Less than 1 |
| Actual cutting time, minutes | 42 | 57 |

**See the new Haynes Stellite 2400-Metal at the Haynes Stellite Exhibit, National Metal Show, Atlantic City Auditorium, Atlantic City, N. J., October 18-22, 1937, Booth G50.**

● This 1 x 1¼-inch Haynes Stellite J-Metal welded-tip tool costing $4.08 machined four of these 43-inch-long forged steel piston rods before regrinding was necessary. The cutting tools previously used failed after 33 inches of travel at slower speed. At the left is a table of comparative data.

Records such as this show how Haynes Stellite J-Metal increases production and saves machining dollars . . . Write the nearest Haynes Stellite office for the book, "Haynes Stellite J-Metal Cutting Tools", a 56-page operating manual on all phases of machining with Haynes Stellite J-Metal . . . Or ask a Haynes Stellite engineer to call and explain how you, too, can use these superior cutting tools profitably. There is no obligation.

PRODUCT OF A UNIT OF UCC UNION CARBIDE AND CARBON CORPORATION

J-METAL HAYNES STELLITE TRADE MARK

*A red-hard, wear-resisting alloy of Cobalt, Chromium and Tungsten*

## HAYNES STELLITE COMPANY

*Unit of Union Carbide and Carbon Corporation*

UCC

Chicago · Cleveland · Detroit · Houston · Los Angeles · New York · San Francisco · Tulsa

*General Office and Works*—Kokomo, Indiana
*Foreign Sales Department*—New York City

*Haynes Stellite Welding Rods and information on other Haynes Stellite Products also are available through the 46 apparatus shipping points of The Linde Air Products Company*

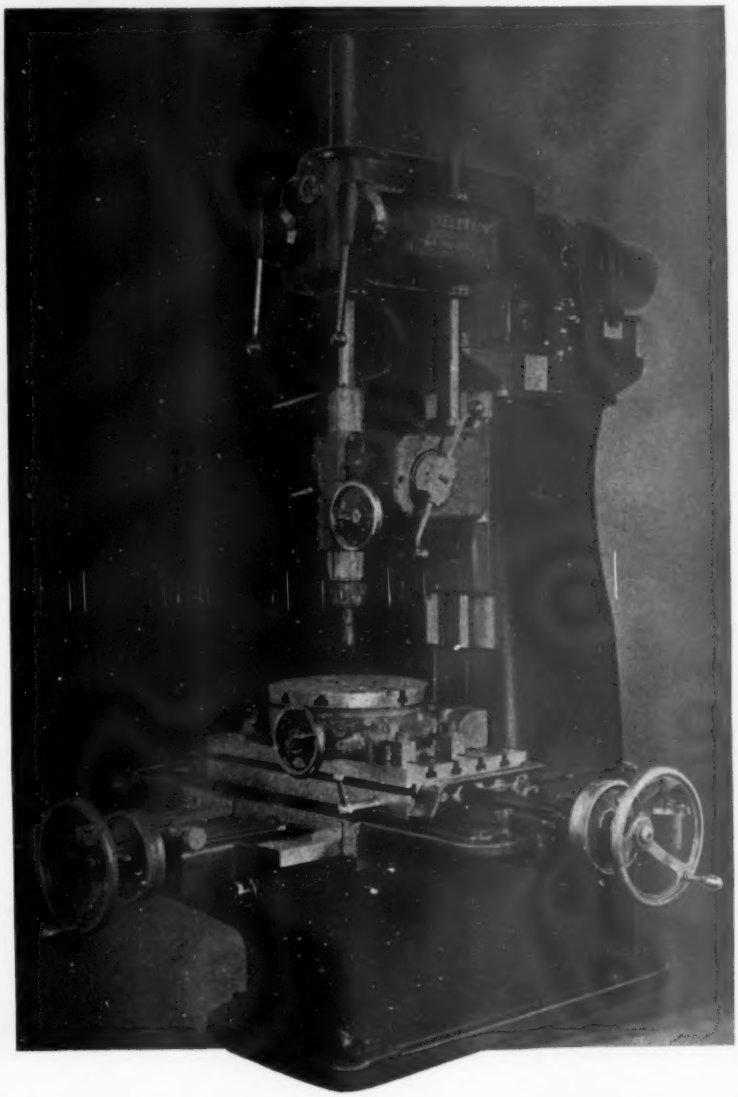
# CLEEREMAN JIG BORER

## Accuracy . . . . High Speed . . . . Adaptability . . . . Simplicity

● The Cleereman Jig Borer is a precision tool designed primarily for jig and fixture work. It is widely used for tool and die work and to economically manufacture numerous parts built in small quantities where jigs and fixtures are not warranted.

The Cleereman Jig Borer will accurately handle drilling, boring, reaming, tapping and light milling operations. It is equipped with precision measuring devices; both precision lead screw equipment and end measuring rods. The base, table, carriage, column and spindle head are all made of Mechanite (60% stronger and having four times the wearing qualities of cast iron).

It is precision built for precision work, yet the cost is comparatively low. Let us give you complete data on this machine. Write for bulletin No. 103.



### CLEEREMAN SLIDING HEAD AND STATIONARY HEAD DRILLS . . .

Cleereman Drilling Machinery includes round and square column sliding head drills, heavy duty stationary head drills and special production machines such as gang drills, rail drills, etc. We will be glad to send complete data on any type of drilling equipment in which you are interested.

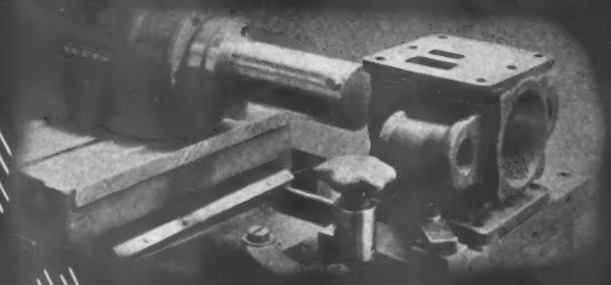
# CLEEREMAN MACHINE TOOL CO.

GREEN BAY, WISCONSIN

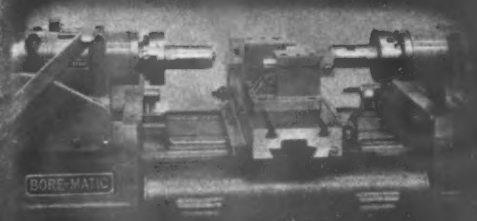
# HEALD *Bore-Matics*

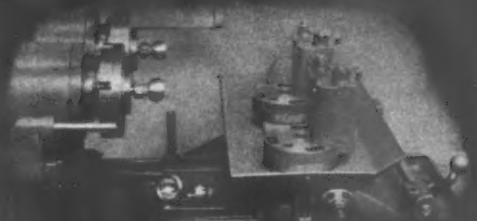
## IDEAL FOR ALL KINDS OF OPERATIONS WHEN *Ultra Precision* IS REQUIRED

**BORING** • Large or small Single or multiple

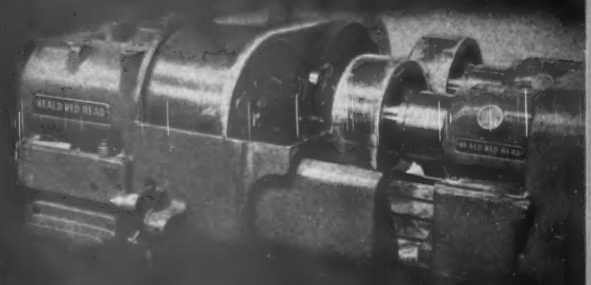


**TURNING** • Straight Spherical Taper



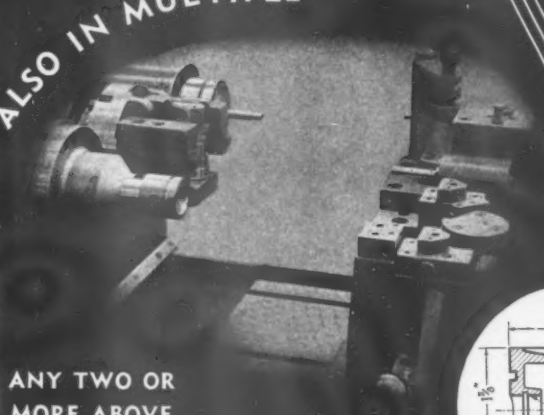



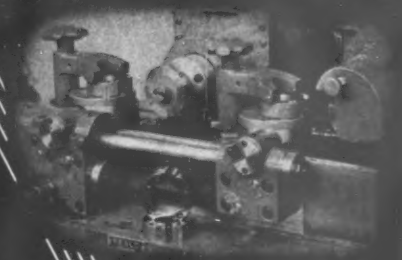
**FACING** • With Tool With Grinding Wheel



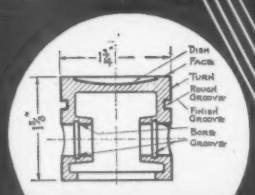

**MILLING** • Slot Spot

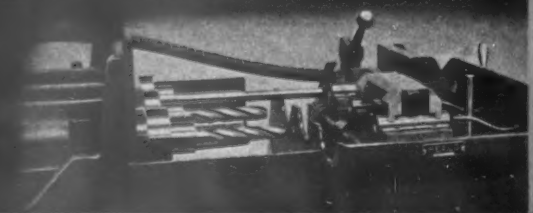
ALSO IN MULTIPLE





**DRILLING** • Roughing Before Boring



ANY TWO OR MORE ABOVE MENTIONED OPERATIONS

HEALD MACHINE COMPANY Worcester Mass. U.S.A.

# The Tool Engineer

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Official Publication of the AMERICAN SOCIETY OF TOOL ENGINEERS

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## Contents This Issue






**Application blanks and information pertaining to membership** in the American Society of Tool Engineers may be had by addressing **The Tool Engineer**, 2842 W. Grand Boulevard, Detroit, Michigan, or the Secretary's office, 5928 Second Blvd., Detroit, Michigan. **Dues** are $5 initiation fee, $6 per year for senior grade membership and $3 per year for junior grade membership. Junior membership initiation fee $2.

**The Tool Engineer** is published on the first Thursday of each month. It is the official publication of the American Society of Tool Engineers, Incorporated. The membership of the Society and readers of this publication are practical manufacturing executives such as master mechanics, works managers, Tool Engineers, tool designers and others who are responsible for production in mass manufacturing plants throughout the nation and in some foreign countries.

Owing to the nature of the American Society of Tool Engineers organization, it cannot, nor can the publishers be responsible for statements appearing in this publication either as papers presented at its meetings or the discussion of such papers printed herein.

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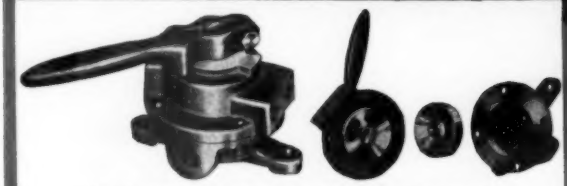
# HANNIFIN AIR CONTROL VALVES



## "PACK-LESS" CONSTRUCTION

Four parts and a handle—and no packing whatever. A simple perfected design for reliable control. The face of the bronze disc is ground and lapped to make a perfect seal with the seat. Simple re-lapping of the seat and disc after long service restores original efficiency.

### STANDARD HAND CONTROL VALVES

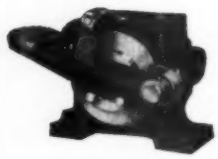
Four-way type for control of double acting cylinders, for air pressures up to 150 lbs./sq. in. or hydraulic pressures up to 250 lbs./sq. in. Four standard types, 45 or 90 degree movement. May also be used for three-way control of single acting cylinders.

### PEDAL OPERATED VALVES

With 45 degree movement, no shut-off position. With 90 degree movement, both outlet and exhaust closed in neutral. May be used as a throttling valve.

### SPRING RETURN VALVES

With 45 degree movement, no shut-off position, and spring return for instant reversal of cylinder upon release of pedal.

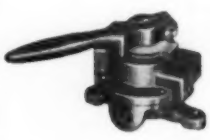


### ROTARY TYPE VALVES

Heavy duty foot operated type. One pressure operates the cylinder, second pressure reverses the cylinder.

### MANIFOLD TYPES

Concentrates control of several cylinders and simplifies piping. Four standard types, 45 or 90 degree movement and spring return types, for various standard cycles of control.



### DUPLEX VALVES

For control of two double acting cylinders, which may be operated in either direction and in any sequence desired.

**Providing the Positive Control and Freedom from Leakage and Maintenance that means maximum economy in air operated equipment**

Hannifin "Pack-less" Air Control Valve design insures the positive and instantly responsive control that simplifies handling and makes for fast, accurate production with any type of air operated machinery. The simple, efficient "Pack-less" design prevents leakage and waste of air power, and eliminates packing maintenance troubles. The complete line includes standard types for any individual operating requirements.

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*Pneumatic and Hydraulic Production Tool Equipment*

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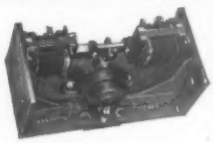

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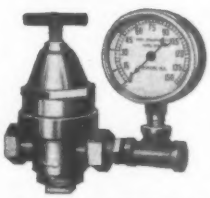


### PRESSURE REGULATING VALVES

A spring loaded piston type regulating valve of high-grade bronze construction, correctly designed for accurate sensitive control. Instantly adjustable to provide the most economical working pressure for any operation.

**HANNIFIN "Packless" AIR CONTROL VALVES**

# PRODUCT DESIGN AND TOOLING --DIVORCE THEM!

*By A. E. Rylander*

THE ideal of a commodity is that it shall serve humanity, but practically it resolves itself to the proposition that it shall also provide a livelihood for the workers that produce it, shall net a profit to its manufacturer and vendors. This refers specifically to manufactured goods, be they automobiles or household appliances—the endless variety of things begotten of this age of mass production.

Volume sales depend largely on pleasing appearance, reliablity and moderate prices. The first depends on product design (the correlation of component parts into a pleasing whole—especially a pleasing exterior), the second on the reliability of components, their assembly and accessibility for repairs, the last entirely on the ingenuity of processing and tool engineers. As an example, it takes considerable ingenuity to produce the modern streamlined automobile, far ahead—in appearance, appointment and reliability—of the highway aristocrat of a decade ago, yet selling, on an average, comparable to the cheapest of that day. It goes without saying that Tool Engineering is largely responsible for the modern product.

Yet, an abyss (fortunately not unbridgeable) separates product and tool engineering; the intermediary between the two is the process engineer. Product engineers seem possessed of a satanic complex to make tooling and assemblies as difficult as possible, yet are usually cooperative enough when the sorely tried tool engineer asks for a compromise; the trouble is that the changes are too often agreed to after expensive dies and patterns have been made. After that, changes involve backtracking, the danger of sacrificing one important unit to provide accessibility in another. There is a way to obviate all that by referring preliminary product design to a competent processing engineer, by which is meant an engineer alive to the problems of both product and tool design, largely experienced in both. By so doing, most of the difficulties of manufacture and assembly can be anticipated without sacrificing appearance, often enhancing it.

The fact is that both product design and tool design are essential to the finished product. Both have their specific problems, yet many problems in common. There should be compatability, which in nowise presumes intimacy. A platonic relationship, let us say; where too closely interrelated they should be divorced on a friendly basis. There is sound reason for this contention, since it presumes that each division will be highly critical of the other. And criticism, when not carping or censorious, is a force for construction.

While process engineering is coming into its own as progressive management sees the sense of it, its possibilities, we are at the beginning of that as in the dawn of Tool Engineering. Both are twin children (but quite precocious) of mass production, but they already rank in importance in industry. Intelligently considered processing means the difference between confusion, frayed feelings and often unnecessary expense of engineering changes and orderly, progressive tooling of product. Process engineering bridges the extremes between product design and tool design. There is a place for it in industry, an important place.

## Letters

*The Tool Engineer*
*2842 W. Grand Boulevard*
*Detroit, Mich.*
*Gentlemen:*

*Please forward me an application blank and information pertaining to membership in The American Society of Tool Engineers.*

*Yours truly,*
*A. F. Morrison*
*331 5th Street*
*Bristol, Tenn.*

We are pleased to hear from you, Mr. Morrison—details have been sent you. In the South's increasing progress toward industrial activities, *Tool* Engineering will play an important role.—Editor.

▼ ▼ ▼

*Dover, New Jersey.*

*Dear Sir:*

*Please send me all information concerning the new Chapter of "Tool Engineers" about to be opened at Newark, N.J.*

*I have seen a few copies of your magazine and certainly would like to be on your subscription list.*

*Sincerely yours,*
*Matthew Ricciardi*
*Box 132*

*P.S. I am employed at Picatinny Arsenal at Dover, N.J.*

"The Tool Engineer" is not sold on subscription. We suggest that you join the A.S.T.E. and receive *all* of the benefits of The Society as well as this publication. A chapter is being chartered very soon in New York City with which you may wish to affiliate.—Editor.

▼ ▼ ▼

*East Moline, Ill.*
*American Society of Tool Engineers*
*2842 W. Grand Blvd.*
*Detroit, Michigan.*
*Gentlemen:*

*For some time your paper has appeared here, at the office of the Deere Harvester Works. I find it very interesting, especially the March number.*

*Is there some way that I may obtain it regularly, personally? I am a tool designer, not engineer, mine is from the bench up, therefore not eligible in your society.*

*Looking forward to a still greater and better "The Tool Engineer" I am*

*Yours truly,*
*A. D. Knanel*
*1711 10th Avenue*
*East Moline, Illinois.*

Tool, die or machine designers having five or more years experience are eligible to membership in A.S.T.E. Applicants must, however, have attained the age of 25 years. Communicate with R. A. Ehlers, 2012 W. Second Street, Davenport, Iowa, who is organizing a "Tri-City" branch of the A.S.T.E.—Editor.

▼ ▼ ▼

*Works of*
*The DeLaval Separator Co.*
*Poughkeepsie, N.Y.*

*The Tool Engineer*
*2842 W. Grand Blvd.*
*Detroit, Michigan.*
*Gentlemen:*

*Kindly send me application blanks and information for both senior and junior membership in The American Society of Tool Engineers, to my home address, Garden Street, Hyde Park, N.Y.*

*Thanking you, I am*

*Yours very truly,*
*J. H. Keller.*

Full details have been sent you. A new chapter of A.S.T.E. will be chartered in the very near future in New York City. Undoubtedly you will want to affiliate with that group.—Editor.

# Milling

By

Ford R. Lamb

Executive Secretary
American Society of Tool Engineers
Technical Editor for This Issue

THIS October, issue of "The Tool Engineer" is devoted to Milling. While milling is not the largest item in percentage of metal removal operations it is a very important operation from the standpoint of volume of metal removed. The Milling operation could be compared to the skinning operation in butchering, since the carcass usually must be skinned before some of the more delicate operations can be performed inside.

Milling equipment is generally more massive than other classes of equipment due to the area of the surface to be finished and results in high unit costs. This fact has caused industry to continue to use old milling machines long after their capacity rating has become obsolete. The newer cutting metals cannot be used to their maximum efficiency in old types of machines.

The surface speeds made possible by use of the carbides as compared with the surface speeds common to the use of high speed steel, indicate the rate of advance in this art during the past ten years. It would be very interesting to be able to look forward ten years and see modern Milling in 1947.

The restless spirit of Tool Engineers, coupled with the economic demand for better production will cause the art to continue to advance for there is a demand for a better living but that better living can come only from better production as a prelude to better distribution.

As Technical Editor of this issue I wish to take this opportunity to express appreciation to the other contributors of articles on Milling for this issue and to thank them for their cooperation.

### Analysis of Milling

Milling is generally understood to mean the process of removing metal through the use of a multiple point tool so arranged that the points follow each other through the cut with each point advancing into the cut an amount known as the chip load per tooth. Since this process usually contemplates having the work stationary or with slow movement and having the Tool revolve, it follows that only a small percentage of the total number of cutting points are at work at the same time.

Certain fundamentals of metal cutting such as surface speed, feed, and cutting tool angles must be observed regardless of whether the process is turning, shaping, drilling or milling and since milling calls into play many duplicate cutting edges or cutter teeth the restrictions or controlling factor applying to one tooth must be applied to all of the teeth.

### Factors Which Control Production

Assuming that the machine is decided upon the first controlling factor is surface speed or the rate of travel of the cutting point (cutter tooth) through the work. The proper surface speed to be used depends on the type of material from which the cutting tool is made and the material to be cut. Nearly all Tool Engineers have data available showing the proper surface speed for tool steel, high speed steel, Stellite or the carbides, when used to cut aluminum, brass, cast iron, steel, etc., and this data can be modified according to the specific quality of metal to be cut and from plant practice and experience.

Feed, the next important factor, is the rate of table travel or resulting thickness of cut by each tooth of the cutter. Thus it is readily seen that the number of teeth in the cutter has a direct bearing on the feed or table travel.

Different materials require different chip loads per tooth and the quality of finish is effected by the chip load per tooth, consequently the chip load per tooth is the factor which determines the feed or table travel. Different feeds can be used by using cutters with more or less number of teeth without materially changing the chip load per tooth.

The art of processing a milling operation brings into play a knowledge of machines, tools, speeds and feeds. The known factors to start with are the number of pieces required per hour, the size and material of the part to be milled, the approximate amount of stock to be removed and the quality of finish.

It then becomes necessary to select the machine to be used. The operation to be performed will determine whether plain surface, straddle, rise and fall, etc., type machine will be required and the rate of production will determine to some extent whether single or continuous milling is required. The part to be milled usually fixes the size of the cutter, thus the width of the milled surface requires either one cutter to cover the entire surface or a multiple of cutters to divide the cut. Very often two cutters will be used on a roughing cut face milling operation but one cutter is preferred for the finishing cut because it eliminates the necessity for great accuracy in depth adjustment of two spindles.

The surface speed offers the Tool Engineer some latitude since he has several different cutting metals with different peripheral speeds to choose from. His selection will be governed by the production rate. After this selection is made the resulting permissible surface speed and cutter diameter will determine the revolutions per minute of the cutter.

The next step—figuring the feed or table travel also offers the Tool Engineer some latitude because he can use coarse, medium or fine tooth cutters to obtain different rates of table travel without changing the proper chip load per tooth.

The R.P.M. of the cutter multiplied by the number of teeth in the cutter will show the number of teeth per minute through the cut, multiplied by the chip load per tooth in inches will give the table travel in inches per minute.

### Example

Face milling the the gasket surface of a cast iron cylinder head 22 inches long by 7 inches wide. Fifty pieces per hour. Eight inch cutter required to cover surface.

Using Stellite J Metal. 140 F. per minute permissible.

Using Forumla $\frac{4S}{D} = \text{R.P.M.}$ or $\frac{4 \times 140}{8} = 70$ feet S.S.

Selecting a fine pitch face milling cutter 8 inch diameter has 26 teeth.

(Continued on Page 44)

# The SPICE of LIFE in MILLING OPERATIONS

By

C. E. Kraus

The Ingersoll Milling Machine Company
Rockford, Illinois

Figure 3.

IN recent years many interesting milling applications have been incorporated in special purpose and high production machine tools. These machine tools themselves have been of many unique types and have incorporated many unusual features of design. Examples could be cited from nearly every field of manufacture. Small high speed automatic machines combining various milling and drilling or related operations on parts weighing from a few ounces and up have been built and at the other extreme are huge machines with semi-automatic cycles powered to remove a large amount of material from very large or heavy work pieces. Among the latter class of machines are the scalpers designed to remove localized surface imperfections such as seams or entire surfaces from cast or rolled ingots, billets or sheets. Because of their specialized nature and restricted field, they are not very well known and a description of a few types should be of general interest.

Fig. 1 shows a machine, recently built, which represents a type that has been used for a number of years. It is a deseaming machine used for reclaiming steel billets which otherwise would be rejected due to very deep seams or imperfections. It has a single horizontal overhung spindle designed to carry solid or inserted blade high speed steel helical mills or half round slabbing cutters. The cutter shown in the illustration is an inserted blade helical mill 8" in diameter and 9" long and is used to scalp completely the sides of billets. The half round cutters are used when it is required to follow a seam or imperfection which usually does not occur in a straight line on the billet. The round nose prevents sharp breaks or edges which would interfere with rolling operations. These cutters are used to remove seams up to 1½" to 2" deep and the machine is hand controlled with vertical, horizontal and crossfeed motions under control of the operator for ease in following the desired path of the cutter. Spindle speeds on this machine are such as to allow a range of cutting speed from 20 ft. on hard alloy billets up to 60 ft. per minute for the softer alloy steels. It will handle billets from 2½" to 12" square and from 3 ft. to 12 ft. in length. The feed rate is dependent upon the cutting conditions and may be infinitely varied over quite a wide range. This machine is capable of taking heavy climb cuts and is very ruggedly designed. The vertical feed is obtained by motion of the saddle, and the crossfeed is obtained by feeding the quill carrying the spindle.

Figure 1.

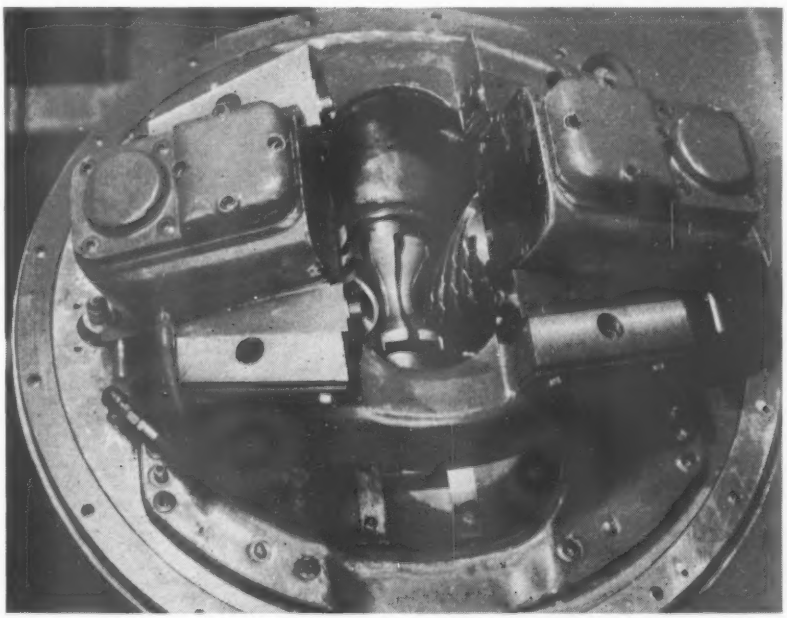


Fig. 2 shows a machine of quite a different type which has a number of very unusual features. It is designed to scalp the face of horizontally cast electrolytic copper billets which are to be later drawn into copper wire. The top surface of such castings is very rough and oxidized. It is necessary to remove this surface entirely to prevent surface imperfections in the resulting wire which would cause frequent breakage of the wire as it is being drawn through the dies. Sharp edges along the billet also have a bad effect on the drawing operation. This machine has three horizontal spindles carrying one 12" face milling cutter and two special radius cutters for rounding the edges. The position of the two radius cutters is cam controlled so that the radius produced on the bar follows the contour of the ends of the billet. The cutters are driven through high helix worms by a 50 h.p. motor equipped with a meter to register the horsepower consumed at all times.

The fixture which is carried on the table is hydraulic, the hydraulic pump, drive motor, and controls being carried with the fixture. The bars coming to the machine are placed in a loading fixture as shown in the figure. Adjustable stops on this holding fixture allow the bar to be so placed that the cutters will remove any predetermined depth of stock. The fixture carried on the table has cylinders which position the billet against these stops with sufficient force to straighten the billet in case it is bent. Vertical cylinders then force serrated jaws against

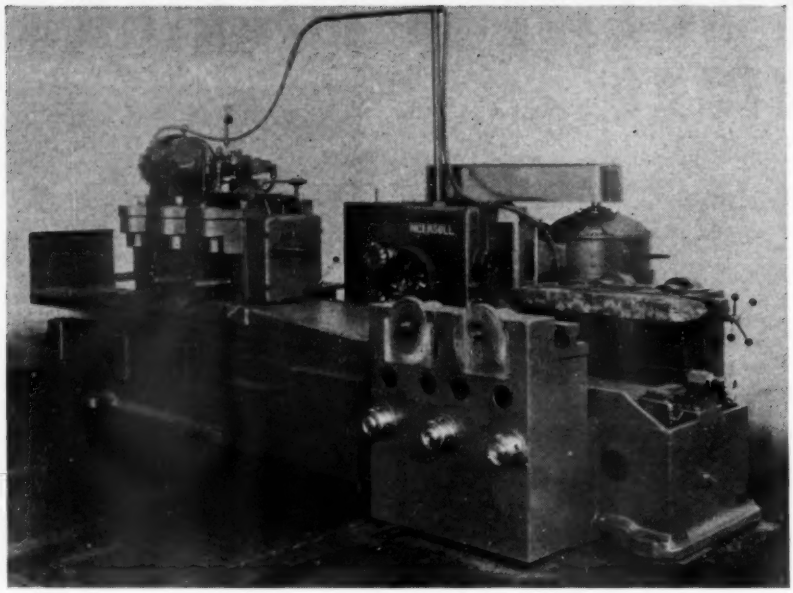


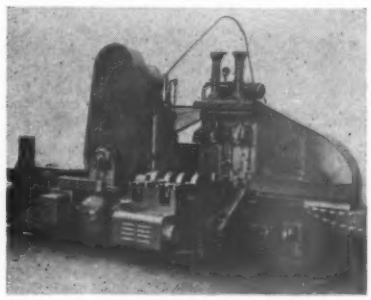
Figure 2.

the side of the billet, holding it in the straightened position. After feeding past the cutters, the billet is unclamped and ejected onto an unloading platform. The usual amount of stock removed on this machine is about ⅜ of an inch on the flat side. When machining bars 4½" wide and $4\frac{7}{16}$" deep x 66" long, the machine will scalp 32½ bars per 51 minute hour, using a feed rate of 82" per minute. Under these cutting conditions, a tool life of 24 hours has consistently been obtained and the copper is removed at the rate of about 140 cu. inches per minute, a cutting efficiency of nearly 3 cu. inches per horsepower. Feed rates of the machine are adjustable between 60" and 90". The operator can vary the feed rate by means of a hand controlled rheostat through the adjustable speed D.C. feed motor to keep the drive motor pulling up to rated power. The cutters are of the inserted high speed steel blade type and the cutting speed is 1,000 feet per minute. The machine shown in the figure is designed for two cutting heads, one on either side of the machine. So equipped, it could cut two bars at once and double the production. The ways of the machine, which are not visible in the picture, are hardened and ground steel tubes into which are pumped lubricating oil under pressure. The oil leaves the tubes through holes distributed along the way surface, providing a continuous film of oil on which the table travels. The feed is by means of a three thread high helix worm and the feeding cycle is automatic, traversing at high speed to the point of the cut, feeding through the cut at a preset adjustable rate, and rapid traversing to the unloading station where the bar is ejected.

Not all copper wire bars are cast horizontally. Some of them are cast vertically and the sides of the billets are usually sufficiently free from imperfections so as to cause no difficulty in the drawing operations. The ends, however, need to be pointed to facilitate entering the bars into the break-down rolls and to prevent wasting a portion of the tail of the billet. These points are preferably of the same cross sectional shape as the bar, with rounded corners. A view of the machined end of the bars is shown in Figure 3. Another scalping machine is equipped with two saddles mounted on flat ways and arranged to feed toward the stationary fixture, forming the central portion of the machine. Each saddle carries a comparatively slowly rotating cutter head having three special cutters carried on high speed spindles. A close-up view of one of the rotating cutter heads showing the cutters is shown in Figure 4. Of the three cutters carried in the cutter head, two are conical solid high speed steel helical mills having an average helix of 45 degrees and twelve teeth notched to break the chips. These are carried in spindles, the position of which is controlled by a large ring cam in such a fashion that as the head rotates, the cutters move in and out and leave a square point on the bars. Except for the cam action, the cutting is similar to that of an ordinary pencil sharpener. The parabolical cutter, visible in the center, is carried on an axis fixed in the rotating drum and rounds the ends of the bars. These cutters rotate at a peripheral speed of about 600 feet and each head is driven by a 30 h.p. motor. The bars, which are about 4" square, are loaded into the machine from one side at the rate of 50 bars in a 51 minute hour, and are transferred to the hydraulically clamped holding fixture on the centerline of the machine, clamped, cut, unclamped, and transferred to the other side of the machine where they are unloaded and the transfer bar returned to the starting point automatically. The feeding motion is obtained by feeding the two rotating drum heads into the bar from either end. The rate of feed of the heads is not uniform and is obtained by a hydraulic cylinder and a cam controlled feed valve. The rotational speed of the drum carrying the cutters may be changed through pickoff gears. The oil pressure for the feeding and clamping cylinders is obtained from a double vane-type pump driven by a 7½ h.p. motor. The rotating head is arranged to dwell for a predetermined interval at the end of the feed motion to allow the cutters to clean up the end of the bar. The finish produced on the points is a function of the cutter speed, drum rotational speed, and length of dwell. In this case no very fine finish is required but the points should be free of scratches or other imperfections which might cause trouble in the drawing operations. An average of 32 cu. in. of copper weighing about 10 lbs. is removed from each end of the wire bar in this machine.

Still another type of scalping machine is shown in Figure 5. In this case the ingots are of aluminum, either cast or hot rolled. The ingots are rectangular blocks ranging from 1¾" to 8" thick, from 12" to 30" wide, and from 24" to 50" long.

Figure 4.



They are later rolled into sheet form and it is absolutely essential that the surface of these ingots be free from all imperfections or even minor scratches. The surface must be practically a mirror finish. The finished sides of the ingots must be parallel within $\frac{1}{64}$ of an inch for each 12" of width and length. An average thickness of stock removed is $\frac{3}{16}$ of an inch per side. The machine scalps one side of the billet at a time requiring two operations per billet. It has a single horizontal spindle which carries a 32" cutter having 24 roughing blades and four finishing blades. The four tungsten carbide finishing blades are of a special shape and arranged in adjustable blocks spaced at equal intervals around the cutter inside of the circle of the roughing blades and set out a little farther from the face of the cutter body. The cutter has a cutting speed of 2400 feet and is connected to a 75 h.p. drive motor through V-belts. There are no gears in the drive train. The ingots are loaded horizontally onto a loading fixture which tilts them into the vertical position. The ingot rests on a plate which is adjustable so as to control the depth of cut taken. The holding fixture itself is again mounted on the table and carries its own hydraulic clamping equipment. After the ingot is positioned in front of the holding fixture by the loading fixture, a group of pins in the holding fixture actuated by a 1 h.p. motor forces the ingot against the adjustable plate in the loading fixture and, in this position, it is clamped by the two vertical hydraulic cylinders on the table fixture. The machine is so interlocked electrically that the feed cycle cannot be started until the ingot is properly located and clamped and the loading fixture removed to clear the face of the ingot. The feed cycle itself once started is automatic in that it traverses to the cutting zone, feeds through the cutting zone and traverses to the unloading position where it stops. The fixture is then unclamped, the ingot transferred to the unloading fixture, and tilted back to a turnover device which turns the ingot over and leaves it right side up for the second operation. Conveyors transfer the ingot to and from the loading and unloading stations and are not shown in the figure. After the ingot is removed from the fixture, the table is traversed back to the loading position. The feed rate of the machine is adjustable from 12" to 72" per minute by means of three selectors and a 4 to 1 adjustable speed D.C. motor controlled by a hand rheostat. The feed motor is a 3 to 5 h.p. motor and the traverse motor is a 10 h.p. motor. The loading, unloading and turnover fixtures are hydraulically operated from a separate pump. A chain type chip conveyor powered by a 2 h.p. motor is arranged to lift the chips some 5 feet into a suitable container. The chips from this machine, incidentally, are in the form of long thin ribbons and are quite bulky. The machine is controlled by the push button station visible in the figure on the loading side and with supplementary controls on the unloading side. Typical production figures for representative sizes of ingots are as follows:

An 8" x 30" x 40" cast ingot is machined at a feed rate of 36" per minute at the rate of 11 per 51 min. hr.

A 1¾" x 12" x 24" cast ingot is machined at 72" feed per minute at the rate of 21 per 51 min. hr.

Cutting fluid supplied by a separate coolant pump is pumped through the spindle and deflected by a specially shaped nozzle against the cutting edges directly in the cutting zone.

Another machine, much larger and more powerful, will handle ingots from 2" to 16" thick, 36" to 63" wide, and 38" to 120" long. Ingots 5½" thick x 48" wide x 64" long can be machined on both sides at the rate of five ingots per 54 min. hr. This would correspond to 62,000,000 pounds of aluminum per year of 310 days, working 24 hours a day.

Another quite different type of scalping machine is used to scalp pure nickel or Monel metal billets weighing around 7,000 pounds apiece. The machine has two spindles, one horizontal, carrying a 22" specially designed extra heavy duty face mill and the other spindle, a vertical one, carrying a radius cutter to round the corners of the billet. These two materials when cast have a sort of spongy semi-oxidized surface layer which varies somewhat in depth but usually requires at least a quarter of an inch cut to remove. The material is extremely tough and requires considerable power. The face mill rotates at a speed which may be varied from 3 to 6 r.p.m. by means of a 2 to 1 adjustable speed 30 h.p. D.C. motor. Both spindles are carried in quills which are adjusted by hand wheels to special setting blocks not shown

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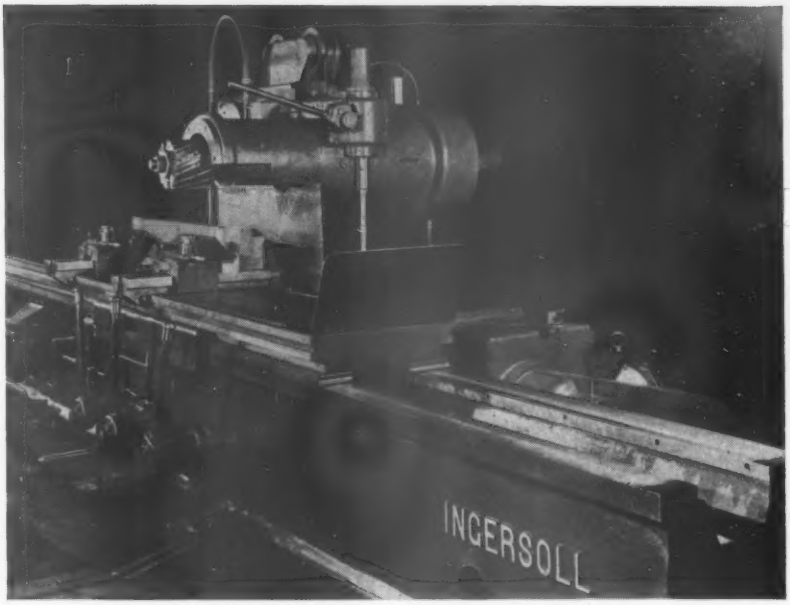



Figure 5.

Figure 6.

# *Unique Hydraulic Control*
# PROVIDES SOLUTION FOR
# *a Very Unusual* MILLING PROBLEM

By

Millard Romaine, Mgr.

Engineering Service Department
The Cincinnati Milling Machine Co.
Cincinnati, Ohio, U.S.A.

OCCASIONALLY a high production milling job has to be done which cannot be handled by stereotyped methods, but requires some unusual mechanism. Such an operation is that of milling an aluminum oil pan for a prominent motor manufacturer. The operation is that of milling the bosses on this oil pan which is shown in cross section in the sketch, figure 1.

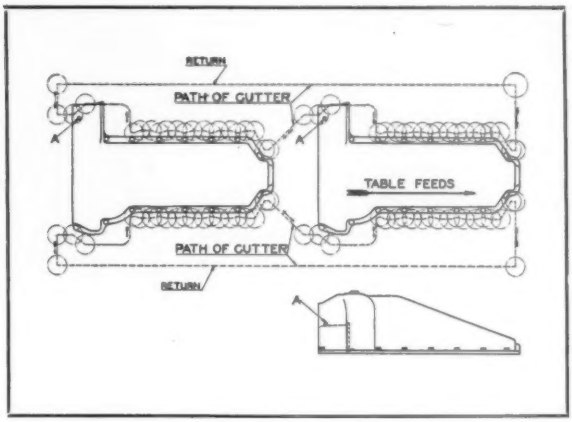
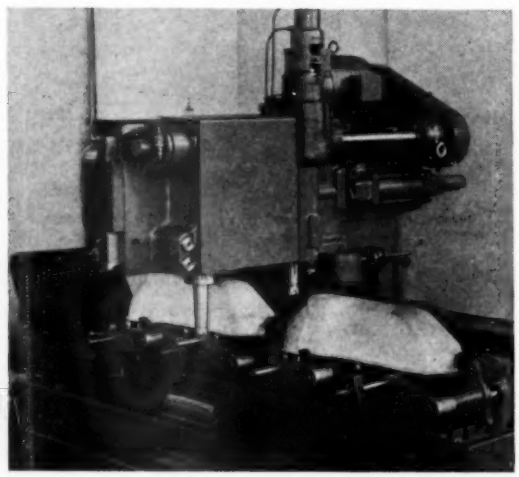



**Figure No. 1—Path of cutters milling bosses on aluminum oil pan is illustrated by dotted lines.**

While a number of the bosses on each flange might possibly have been milled using a cutter moving in one direction only; due to the shifting of the casting, it was felt that there would be danger of undercutting the walls of the casting if the cutter were moved in a straight line. In addition, there were other bosses at varying distances from the central line of the work, so that in order to mill all of the bosses with one cutter it was necessary to move it through a very irregular path. In addition, one boss marked "A" on the drawing, was in an entirely different plane from all the rest of the bosses, so again a special arrangement had to be considered.

Had the customer's requirements been for rather small quantities the machining might have been done by using a heavy hand profiling machine. The production obtainable this way would hardly have exceeded 15 to 20 pieces an hour. Since the actual production required was about 250 pieces per hour, entirely too many machines and operators would have been required for economical output by the hand profiling method.

**Figure No. 2—Cincinnati 5-60 Plain Hydromatic with special equipment for performing operation shown in Figure 1.**



After due consideration of all factors involved, the machine shown in figure 2 was developed. This is a special adaptation of a Standard Cincinnati 5-60 Plain Hydromatic Milling Machine. The machine consists essentially of a bed-table unit having a table 20" wide capable of 60" of movement, the working surface of the table being 78" long—long enough to hold two pieces in a row.

Upon this table were mounted two quick acting cam operated fixtures, one behind the other, each of which holds one piece.

Mounted alongside of this bed-table unit is a flat top upright carrying a fixed height rail. Mounted on this rail were two vertical spindle heads, each containing a single vertical spindle operating at 1500 R.P.M.

These two vertical spindle carriers were arranged for movement back and forth on the rail and were connected up in such a way that they operated like a pair of scissors. In other words, movement was symmetrical around the centerline of the axis because, as one can see from the drawing of the piece, the pads to be machined are symmetrical around the major axis of the work. This scissors movement was controlled by a hydraulic cylinder operating on one spindle carrier, from which the motion was transmitted by means of two racks and a stationary pinion to produce an equal motion on the other spindle carrier. In order to cut out backlash and give accuracy of movement, a special arrangement was made whereby hydraulic pressure was applied to keep out back-lash. The construction of this central actuating mechanism is shown in detail in sketch, figure 3. Both spindles were driven by a constant speed drive shaft from a constant speed motor mounted on top of the rail.

The paths of the cutters are illus-

trated by the dotted line in figure 1. The reader will note that at one point of the path of the cutter, it is necessary to practically stop the table movement and to move the spindles at right angles to the direction of table movement. With the table stationary, it would be practically impossible to use the ordinary type cam operated mechanism where the movement of the table actuating through a cam roller produces the movement of the head sidewise. Angles encountered in cam development would be entirely too steep and at the point indicated the mechanism would tend to lock up, as the requirement would be for almost zero movement of the table to produce a very rapid movement in the other direction.

Of course, an arrangement could be made where the movement of the table operating through tripping mechanisms engages the cross movement of the spindles, but since the cross movement of the spindles required fairly accurate positioning of the spindles at different points in the table travel to keep from cutting

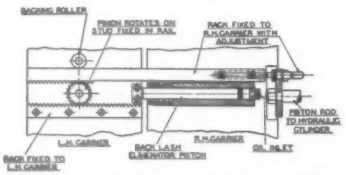



**Figure No. 3—Special arrangement whereby hydraulic pressure was applied to keep out backlash.**

in to the main body of the casting, this would have meant an elaborate setting of dogs and all in all would have been a rather complicated proposition.

The solution to the whole problem was found in the adaptation of a tracer controlled mechanism. Built on to the side of the work holding fixture are a series of support arms which carry a template, or cam. The right-hand spindle carrier carries a tracer head carrying a ball-shaped tracer which bears against this template or cam. Deflection of the tracer head rotates a spline shaft connected by means of a lever arm, to a flow dividing valve. This valve operates to divide and control the flow of hydraulic oil between the cylinder under the table, which operates the table, and the cylinder on the rail which operates the spindle carriers. In its mean position, no oil goes to the cylinder operating the spindle carriers, all of the oil going to the table cylinder. In one extreme position, no oil goes to the table cylinder, all the oil going to produce movement of the spindle carriers in one direction. In the other extreme position, no movement of the table takes place and all of the oil goes to control the movement of the spindle carriers in the opposite direction from that resulting from the other extreme position.

Intermediate positions result in the oil going in varying proportions to the table cylinder and to one or the other end of the spindle carrier operating cylinder.

This valve and this tracer are controlled by a spring so that if the tracer is not in contact with the cam, the valve is opened in such a way that all of the oil goes to the end of the spindle carrier operating cylinder, tending to move the spindle carriers towards each other in the direction to bring the tracer in contact with the cam.

This movement continues until the tracer contacts the cam, after which the movement is controlled by the cam shape.

In addition to the above mechanism, it is possible by throwing the dog-operated trip lever on the front of the bed of the machine, to by-pass the tracer control circuit entirely, which results in all of the oil going into the one end of the table cylinder, tending to return it to starting position; in other words, tending to move the table to its extreme left-hand position.

In addition to the flow divider valve above mentioned, the circuit is supplied with two balancing valves which are designed and operated to make certain that when the flow divider valve is set to give, for example, a 70-30% division of the flow between the table cylinder and the spindle carrier operating cylinder, that that percentage is maintained regardless of resistance, to movement of either member occasioned by friction, weight of the part, cutting pressure, etc.

There is also provided a short circuiting stop valve which stops all hydraulic flow.

The operation of the equipment is as follows: The operator loads one piece on the extreme right-hand end of the table and opens the stop valve in the hydraulic circuit by means of the starting lever shown on the outside of the machine bed.

The first thing that happens is that the spindle carriers move toward each other until the tracer contacts the cam. Immediately the tracer contacts the cam, cross movement stops and the table movement starts. The relative movements of the spindle carriers and of the table then are controlled by the shape of the cam, and the cutters produce the path illustrated above.

While the cutters are operating on the one piece, the operator removes and replaces a piece in the fixture on the left-hand end of the table. The table continues this movement and eventually the cutter starts to mill the bosses on the second piece. While the cutters are engaged on the second piece, the first piece is removed and replaced.

At the completion of the second piece, the tracer follows a shoulder on the cam, causing the spindle carriers to move so that they are at the maximum distance apart. This accomplished, a dog on the table strikes a trip plunger, mounted in the bed at the side of the table, which reverses the main selector valve in the hydraulic unit in the bed of the machine, by-passing the tracer control mechanism and operating to return the table to its starting position. At the end of the return stroke, another dog on the table again reverses the trip plunger, bringing the tracer control system into operation, whereupon the heads approach each other until the tracer strikes the template, when the operation is repeated.

As indicated in paragraph two above, another complication was introduced by the fact that one of the bosses on the oil pan was in a different plane from the rest of them. This necessitates an axial move-

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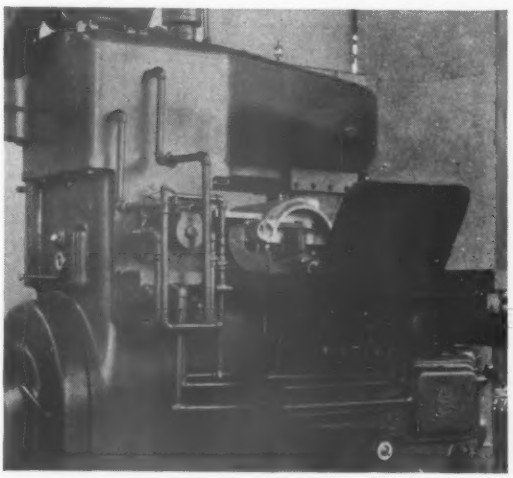
**Figure No. 4—The valve body containing trip plungers which are operated by dogs on the table are shown here.**



# The Engineer in a Changing World

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By

Ralph E. Flanders

**What can and should engineers do about the social and economic problems that beset the modern world? In answering this question, Doctor Flanders says: "We must exercise our responsibility more for the sake of society as a whole than for the sake of ourselves as individual engineers or for the private interests of the businesses with which we may be connected." He states further that: "It is an inescapable duty that we each make of ourselves centers of education and influence, to the end that our useful offices may continue, and our civilization fulfill its destiny of an ever-growing service to the needs of mankind."**

THE WORLD in which we are living is changing in many ways, and those changes are rapid. The physical frontier has disappeared from this continent and, except for the anarctic regions, it has practically disappeared from the earth as a whole. With the occupation of the frontier has gone one of the powerful automatic stimuli to private enterprise and material progress.

Much of the progress we are making is so based upon elaboate research and requires such extensive and expensive provision of facilities that it is best carried out by large corporations or well-financed research groups, rather than by individual scientists, engineers, and inventors of the old type. This is another influence that tends to restrict the expansion of individual initiative and tends to throw the burden of further social progress onto aggregations of capital and of men.

A further element in our increasing socialization is the recent rapid sensitizing of the social conscience and a resulting expansion of social activity into fields of action which in past generations had been considered reserved for the individual or for small social groups. The severity of the depression was so great and the social responsibility for it seemed to be so definite that both our relief measures and our recovery measures have tended to be social and political, rather than individual and philanthropic.

Finally, though without exhausting the list of recent developments, we have become aware of the fact that in our banking, credit money, and general aggregate of financial institutions, we have a useful but delicately balanced, and at times unbalanced mechanism difficult to control and tending on the whole greatly to increase the violence of business fluctuations and economic distress, rather than to provide a dampening effect on them. All these phenomena and others not mentioned pose a new set of problems to the engineer and to the engineering societies in which they are organized.

In their beginnings and until recent times, engineering societies had the purely technical purposes of bringing to the attention of their members all the latest technical developments in their fields and offering a forum for criticizing them, advancing them, and disseminating knowledge about them.

Even while this type of activity remained almost the sole object of society-action, the problem nevertheless began to be complicated by the numerous divisions into which engineering work began to elaborate itself. Engineers were no longer simple engineers. Some were in control of their own businesses as consultants or manufacturers of engineering apparatus; others were employees of various grades. Some were engaged in teaching; others in research, design, construction, sales, operation, and administration. This multiplication of function brought a host of new problems to the engineering societies, on the one hand opening new opportunities to usefulness, and on the other tending so to elaborate engineering activities as to lose much of the harmonious directness and strength of the earlier days.

As a result of the tendency for engineering advance to be focused in and to be carried out by large aggregations of men and of money, the problem of the engineering society has been complicated further by widespread sentiment in favor of entering employer-employee relations, so that in the extremes of such policies the societies might be tending to take on some of the aspects of trade-union organizations.

This continuous elaboration of function is here described and emphasized so that we may realize that the problems facing us are no longer simple, and that any endeavor forcibly to keep them within too simple lines may result in giving to the societies a cloistered and sterile outlook, devoid of vital function and social usefulness. We are in fact faced with the problem of maintaining our social usefulness and finding out just what are the spheres in which it most clearly may be demonstrated and exercised.

### World of Today a Product of the Engineer

The world we know has been made by the engineer so far as its physical aspects are concerned, and his influence has had no small part in determining its spiritual environment.

Perhaps some remember the epitaph of Sir Christopher Wren, the architect, engraved on the walls of his masterpiece—St. Paul's Cathedral in London. It reads: "Si monumentum requiris, circumspice," or, in English, "If you seek his monument, look about you." In like manner, if we wish to inquire as to the material influences of the engineer, we have but to look about us. We will see thousands of daily reminders of the fact that our material civilization has at the bottom an engineering foundation.

Its useful services are many. Our profession has filled the world with a profusion of comforts and luxuries which were denied to kings a short century ago, but are now enjoyed by the average citizen. Flowing water in the kitchen and bathroom, brightly lighted streets, and the radio, are all ordinary conveniences for the ordinary citizen. They were

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An address delivered at the general session on the economic aspects of engineering and Institute activities held during the AIEE summer convention, Milwaukee, Wis., June 23, 1937.

RALPH E. FLANDERS is president of the Jones and Lamson Machine Company, Springfield, Vt. He began his technical career as an apprentice machinist in 1897, and became president of the Jones and Lamson company in 1933. He has received several honorary degrees. Doctor Flanders has devoted much time to engineering-society activities, having served as president of the American Society of Mechanical Engineers, and as member or chairman of many ASME committees. He is vice-president of American Engineering Council and chairman of the AEC committee on relation of consumption, production, and distribution; since 1932 he has been active in the public works program of economics and has been a director of the Social Science Research Council. He has written numerous technical papers and 2 books.

# *Designing for*
# DYNAMIC AND STATIC BALANCE CORRECTION

PART II

by
H. W. MOORE, President
**Globe Tool & Engineering Company**
**Dayton, Ohio**

ON VARIOUS parts to be balanced, each requires study to determine the best and most economical method for correction. Naturally it would be impossible to cover all problems encountered. The following show some common applications and suggested methods for correction.

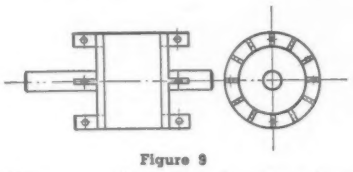

**Figure 6**

One manufacturer of motors having face type commutators has solved his problem as in Fig. 6. The driving band on the right side next to the commutator provides an excellent place to add solder in graduated amounts for correction in this plane. On the fan end, they have provided pierced holes in which lead rivets of graduated weights are inserted.

Squirrel cage rotors, used in the majority of motors, are usually corrected by drilling as in Fig. 7, into the lamination below the conductor band. This requires removing the part from the machine, drilling for correction, and again inserting the part in the balancing machine for check. A very simple but effective method is suggested in Fig. 8. Here the laminations are pierced below the conductor band with a series of holes. Plugs of various lengths can be inserted in the machine in a very short time for correcting the unbalance.

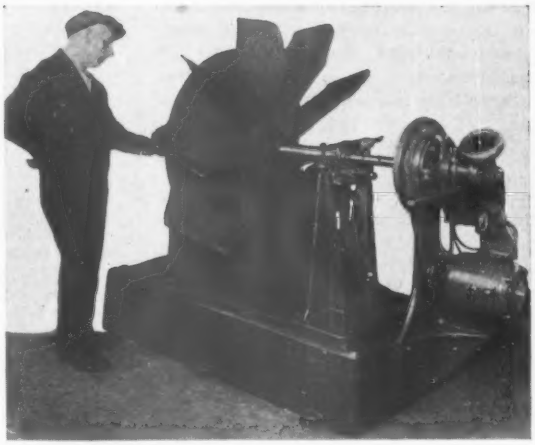

**Figure 11**

On larger rotors where fans are fabricated as part of the conductor band (see Fig. 9), an excellent plan is to pierce this fan blade as shown. At these holes weights or rivets of graduated weights can be added in the machine quickly. With this arrangement the weights are far apart and are extremely effective. Attached at the maximum radius of course makes them more effective.

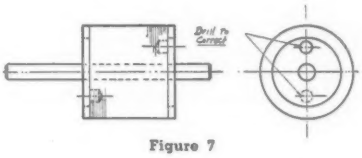


**Figure 7**

Large extractor drums are usually badly out of balance and require considerable correction. Here there is no visible correction method but weights are added inside the flanges at each end which are riveted or welded in place. If possible, an extra hub or flange could be added on each side of drum on which to add weights.

Large ventilating fans like in Fig. 11 provide two distinct planes at either face on which to add the necessary weights to correct for the couples of unbalance. Here, holes may be drilled or punched for the addition of weights or the proper weight may be arc welded in place.

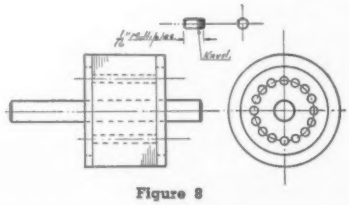

**Figure 8**

Large drier drums also have two excellent available planes for correction. Holes may be drilled in the end flanges on suitable bosses provided for correction. If they do not interfere, weights may be added to

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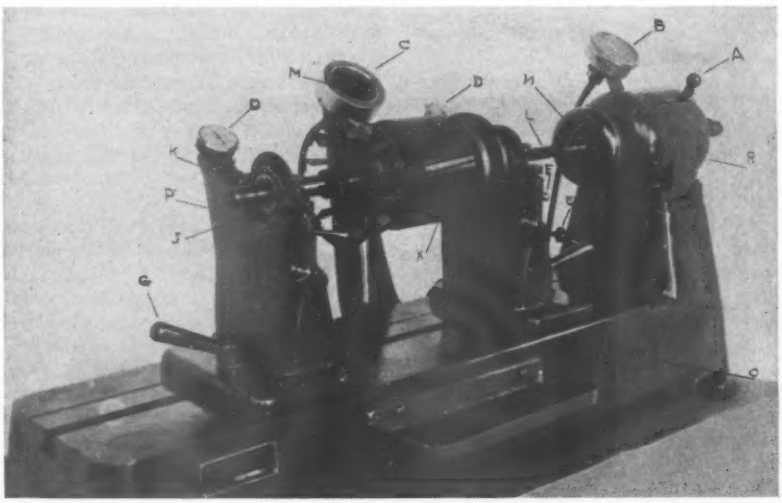
**Fig. 6—Dynamic balancing machine in which a Neon light is used to locate the point of unbalance.**



# PRODUCTION PERSPECTIVES

## News of Mass Manufacturing from Everywhere

### Mid-West

**National Cash Register Co.,** Dayton, Ohio, expects to construct in Dayton **a new unit costing $800,000** including machinery. **Iron and steel have assumed the leadership** of business this year, **replacing the automobile industry** which led the way in the depression, says Col. Leonard P. Ayres, vice-president of the Cleveland Trust Co., in the bank's mid-month review. So far **this year volume of steel production** has been a third greater than in some months of 1936 and it seems certain that **total output will exceed that of 1929,** a notable record in view of the strikes among the independent producers. Business activity in other lines is not so conspicuously high as in iron and steel, Ayres pointed out, but nevertheless the **records for 1937 are for the most part well above** those of similar months in **1936.** Contrary to the general belief **industrial production** has **increased more rapidly** since the World War **in foreign countries than in the United States,** the statistician shows. **Production here is about 20 per cent above** the average of 1923, '24 and '25 **while in rest of the world it is up 50 per cent.**

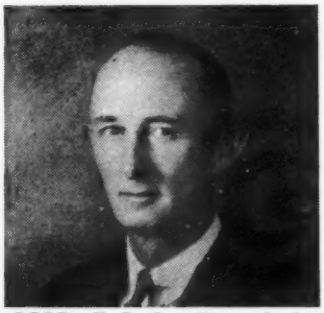
The former Van Dorn Electric Tool Co. buildings at 3000 Woodhill road, Cleveland, containing 70,000 square feet of space, have been purchased by the **Weldon Tool Co.** of Cleveland.

The Weldon Tool Co., headed by **A. Lundstedt** and **Walter and C. A. Bergstrom,** manufacturers of cutting tools will occupy about 35,000 square feet of space of the buildings by Nov. 1.

### New England

**More demand for highspeed steel lines and special alloys is reported this month** and **New England concerns report** very **good orders received currently** from manufacturers in the machine tool and small tool goups. This activity is explained partly as a seasonal move to replenish stocks used up in the sustained fast pace of production in that field and especially as the effect of current rumors of early price increases in this group of steels.

**Manufacture of machine tools** in the Western New England area **is being maintained at an unabated rate,** current repors say. **Van Norman Machine Tool Company** of Springfield, Mass., **reports production at peak** with a good volume of orders in hand. **Kingsbury Machine Tool Company of Keene, N. H.,** is said to have **orders to keep its plant busy until midwinter.**



**A.S.T.Eer H. D. (Pop) Hiatt, who has resigned as Asst. Works Manager Nash-Kelvinator, Racine Plant, to become Service Manager for the Chicago Twist Drill Works.**

**More orders for materials for the textile machinery** industry **are being booked** from such concerns as the **Crompton & Knowles Loom Works of Worcester, Mass.,** the **Draper Company of Hopedale, Mass.** A good share of this business **is attributed to the activity of Southern mills** but Northern mills are buying equipment too, **for both cotton and woolen** production. Considerable **new business is coming** out of the **south for paper mill equipment** of certain types.

The fact that **automobile companies are not yet placing large orders for parts** for their new models and that this is an off-season for refrigerator manufacturing are reasons for a **moderate lag in some manufacturing operations.**

Although the **Westinghouse** Company in East Springfield, Mass., **is planning to move the remaining small-motor production to Lima,** Ohio, soon, **gains in fan production more than compensated for this decline.** Indications are that **air-conditioning production will show an early pick-up** on the strength of current prospects.

**Manufacturers of small tools in Greenfield and Athol, Mass., are setting big records for the year.** A report just made public by the **L. S. Starrett Company,** Athol, tells of a **33 per cent gain this year,** with production increases met by plant improvements. Similar gains are reported for certain other large tool concerns in the district.

**Excellent volume** has been shown **by** the **United American Bosch Company** of Springfield, **and with seasonal increases in prospect** and **Diesel engine** equipment **sales running at a high level** a strong upswing may be looked for at this plant next month.

**Gilbert & Barker** Manufacturing Company's **production of gasoline pumps is** said to continue **at a high level** in the West Springfield plant that shows evidence of being stable through the year, and with oil burner operations due to rise, **this concern may be expected to show employment gains.**

**At Holyoke, Mass.,** the **Worthington Pump** & Machinery Corporation's **employment has risen with more substantial increases promised when the compressor division gets into operation.** The transfer of smaller compressor production from Buffalo, N. Y., was made imperative by gains in departments of that plant, demanding more space.

**Vice-President Scott of The Van Norman Machine Tool Company, Springfield, reports that the company's unfilled order back log is the largest in its history** and is enough to insure capacity operations until well into 1938.

The **Greenfield Tap and Die Corporation,** Greenfield, **announced the entire capital stock of the Russell Manufacturing Company has been purchased by them. The tap and die corporation,** according to the announcement, **expects to liquidate its new acquisition without delay and the land and buildings occupied by the Russell Manufacturing Company are now being offered for sale.**

**Albert E. Culley,** formerly treasurer **of the Culley File Shop,** now the Simonds File Shop, Fitchburg, Mass., **died recently at Saranac Lake, N. Y.**

**Industrial concerns in Worcester, Mass., are operating at a high rate** and with the nation's automobile plants preparing to go into production on 1938 models, Worcester machine tool plants again expect a substantial amount of business. **According to Worcester plant executives retooling this year, however, will not mean a record.**

**John E. Rogers, engine house fore-**

(Continued on Page 28)

# CHAPTER DOINGS

## BRIDGEPORT

**E. H. Ebelhare, Chapter Publicity Chairman**
**323 Trumbull Avenue, Nichols, Conn.**

Bridgeport Chapter's September meeting was held at the Barnum Hotel on Thursday, September 16, preceded by an informal dinner. Chairman John Bullard opened the meeting at 8:00 P.M. Ben Page, Program Chairman, outlined the year's program and then introduced Mr. F. W. Shumard, President of the National School of Time Study, as the guest speaker. Mr. Shumard gave the chapter an interesting and comprehensive talk on Time Study; a discussion period with questions from the floor followed Mr. Shumard's presentation.

One thought left by Mr. Shumard which was of interest to Tool Engineers was that while the time study man values a production operation, he also rates the Tool Engineer who planned and designed the production tools furnished for the operation.

New members welcomed to the Bridgeport Chapter: E. Reaney, R. Bullard, R. Bennett, H. Daniels, E. Ebelhard, O. Soderstrom, S. Smith, C. Shephard, and an old timer, formerly of Detroit Chapter, Norman G. Brownsword.

Bill Allen, Stan Hapgar and Ed. Ebelhare, all of Cornell '32, found themselves unexpectedly thrown together at this meeting—a swell reunion—and, another one at the coming Yale game.

Ben Page started the fall season with a fine meeting. Let's have the rest to come this year as well attended. Incidentally, Ben always seems to steer clear of the trap on the 7th at Wheeler, but the stone walls along the 4th act as magnets for Ben's pellet.

E. Nevens toured some 1700 miles on his vacation and drove by some thirty odd golf courses, yet passed them all up. Evidently keeping his eye on the road was less exacting than keeping it on the pill.

G. Olson, G. Monahan and H. Sedlak of General Electric Tool Division put in their first appearance. Take the plunge, boys, and get in the swim with the Bridgeport Chapter.

A number of present and former associates of Mr. Shumard were spotted among the 130 guests and members. The membership committee had plenty of material to work on at this meeting.

Tool Engineers of the Bridgeport area regret the passing of P. G. Israelson, department superintendent at the Bullard Company. Mr. Israelson's death came after a brief illness. He was a member of the Bridgeport Chapter A.S.T.E., Order of Vasa, Swedish Hundred Society and other organizations of Bridgeport.

### Flint to Have Chapter No. 14

**At a meeting of Tool Engineers at Flint, Mich., Sept. 16th, it was decided to charter Flint as Chapter No. 14 of the American Society of Tool Engineers. Twenty-five membership applications is the minimum requirement for a Chapter charter and that quota was met. However, because the three major industries were not equally represented it was decided to postpone the chartering and election of officers until Monday evening, Sept. 27.**

**A temporary committee, consisting of Messrs. Geo. Atherholt, J. G. Atkinson, Guy J. Bates, Leo J. Berthiaume, Julian Mirau, Edward Newbecker, Ed. Raty and Mr. Leary, was selected to accept applications, arrange details and carry on the preliminaries of organization pending the next meeting which was to take place on Sept. 27.**

## BUFFALO

**O. W. Winter, Chapter Publicity Chairman**
**38 Lowell Road, Kenmore, N.Y.**

Buffalo Chapter held its first annual picnic August 14th, a stag affair and very well attended by about one hundred and seventy local Tool Engineers and friends. If anybody got lost, it was his own fault because blue-printed specifications were sent out, the committee figuring that any Tool Engineer ought to be able to read a blueprint. (Enclosed are the various prints used. You probably won't be able to reproduce them but you may get a kick out of reading them over.)* To say that a good time was had by all would be putting it mild and the outcome (social and financial) was extremely encouraging for future events of this sort. We are now planning a dance or other social event. The program of all the events of the day was arranged by a committee consisting of Bruun, Keller and Donath, who did a splendid job in making this picnic a huge success.

The Buffalo Chapter held its September meeting at the Buffalo Trap and Field Club, September 10th. Dinner was served to over eighty members and friends, with a considerable increase in attendance following the dinner.

After the dinner, Chairman Don Reep welcomed new members and guests and reported the outcome of our picnic which was a success and that is something. Please note—all prospective and present members and visitors. Announcement was also made to the effect that Buffalo Chapter meetings will be held the second Monday of every month. Mr. Reep welcomed and introduced O. W. Winter, Factory Manager of the Columbus McKinnon Chain Corporation of Tonowanda, New York, National Director and Past Chairman of the Detroit and Toledo Chapters. Mr. Winter

* We couldn't, and we did.

**Officers of the Rockford No. 12 Chapter of American Society of Tool Engineers elected at the organization meeting September 10th, left to right: H. J. Caldwell, Barnes Drill Co., Treasurer; Herbert O. Olson, Barber Colman Co., Secretary; E. W. Dickett, Sundstrand Machine Tool Co., Chairman; George Johnson, W. F. & John Barnes Co., 1st Vice-Chairman; K. W. Lund, Ingersoll Milling Machine Co., 2nd Vice-Chairman.**

was appointed Chairman of the Publicity committee and is writing this, so discount by 50%, at least, anything he says about himself in it. He spoke for a few minutes on the past experiences and future of the society and that's plenty to talk about.

Mr. Bruun, Chairman of the Meetings Committee, introduced the speaker of the evening, Mr. H. J. Griffing, Sales-Research Engineer of the Norton Company of Worcester, Massachusetts. Mr. Griffing gave a very interesting and instructive talk on the development and application of abrasives and grinding machines. His talk was accompanied by lantern slides and some extremely interesting and unusual sound motion pictures. After his talk, there was a question forum of an interesting and valuable nature.

## CLEVELAND

**R. B. Oswell, Chapter Publicity Chairman 1585 Hawthorne Drive, Euclid, Ohio**

Cleveland Chapter, A.S.T.E., opened its fall meetings Tuesday evening, September 14th, with a dinner at the plant of the National Acme Company, manufacturers of four, five and six spindle automatics and automatic die heads.

The meeting was called to order by Chairman Paul Zerkle, who introduced Mr. A. E. Dressner, Vice-President in charge of Engineering and Mr. C. W. Simpson, Vice-President and Works Manager. After welcoming the group, they conducted us to the plant cafeteria, where an excellent dinner was served.

After the dinner, Mr. Dressner gave a short talk on the origin and growth of the company and a description of its products. The party was then split into two groups and, with employees acting as guides and lecturers, was conducted through the factory, most of which was in operation, due to the large number of orders on hand.

After the tour of inspection, the groups were returned to the office, where Mr. Dressner and others answered a barrage of questions.

In the course of his remarks, Mr. Dressner stated that the machines were developed to the point, where they now needed better cutting tools and requested that anyone having knowledge of a better cutting tool, bring it to their attenion.

Mr. Simpson gave a short talk on his visit to the Leipzig Machine Tool Fair and stressed the remarkable improvement in the quality and design made by makers of machine tools in Europe. He also pointed out the aid given by European governments in the marketing of machine tools, especially when the manufacturer had competition from foreign manufacturers.

After brief remarks by Mr. Zerkle and the introduction of a visitor from Zurich, Switzerland, a vote of thanks was tendered the National Acme Company and Mr. Zerkle declared the meeting adjourned, to meet at the Colonial Hotel, on Tuesday evening, October 12th, 1937.

Our Secretary, C. V. Briner, was not present at the meeting. We have his excuse but we still suspect that he sneaked back to Dansville, N.Y.

## DETROIT

**R. M. Smith, Chapter Publicity Chairman 12775 Greenlawn Avenue, Detroit, Mich.**

On September 9th the Detroit Chapter opened its first fall meeting with its rousing Theme Song. One hundred and eighty strong lustily placed themselves on the outside of a deliciously cooked and satisfying dinner in the Ballroom of the Fort Shelby Hotel.

A comely maid troubadoured her way from table to table with accordion and songs, taking her cues from the diners, who chipped in with their bassos and tenors of such quality as are only heard at barber shop gatherings.

During the meal souvenirs were distributed. Packs of cards! Thanks Colonial Broach, they were swell!

This meeting was dedicated to our past officers, each of whom was mentioned and "ovated." Of particular interest was the fact that Al. M. Sargent, Past-Secretary, had devoted his talents and time to nursing this growing organization through its first four years of life.

Forty Student members enjoyed our hospitality as was ably attested by their Chairman of the Student Body, Mr. Barnett, who acknowledged an introduction by telling what he and his friends thought of us and how they hoped some day to be on an equal footing with their elders.

A short business meeting followed the dinner. Mr. Kunn, our Public Relations Chairman, told of several openings for Tool Designers and Engineers. He also created much interest when he mentioned that the Speaker's Club would again accept enrollment for the fall and winter terms. We could all benefit from this if we only would! Don't put it off, fellows!

Mr. Fors, Program Director, spoke of future interesting meetings to be held this winter and mentioned that we were invited by the Great Lakes Steel Corporation to inspect their new 96-inch steel strip mill at our next meeting.

This news was enthusiastically received and it was unanimously agreed to accept their offer. Such an inspection trip should prove very instructive and interesting.

Now came Colonial Broach Company's turn to enlighten the chapter with exceptionally clear slides showing the history of broaches and broaching and carrying us along through the myriad steps entailed in designing and making broaches and broaching machinery up to the present day.

Mr. William Hart, their Chief Engineer, explained all salient features as the numerous views were shown and ended his talk by thanking us for the opportunity afforded him.

Thank you, Mr. Hart. We enjoyed it immensely. These meetings are getting better all the time.

▼ ▼ ▼

Mr. Donald Woodworth, Tool Engineer with the Detroit Gear and Machine, is convalescing at Grace Hospital, following an operation. Here's to you, Don!

**The Detroit Chapter Speakers Club**

Announces the opening of the fall series of classes Tues. evening, Oct. 5th, 8:00 P.M. at the A.S.T.E. Headquarters, 5928 Second Blvd., Detroit, Mich.
Offering:—

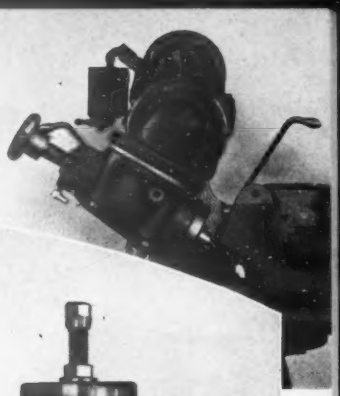
Short speeches before an audience of critical classmates under professional coaching and criticism. Ten classes with reference books, special meeting places, and debates.

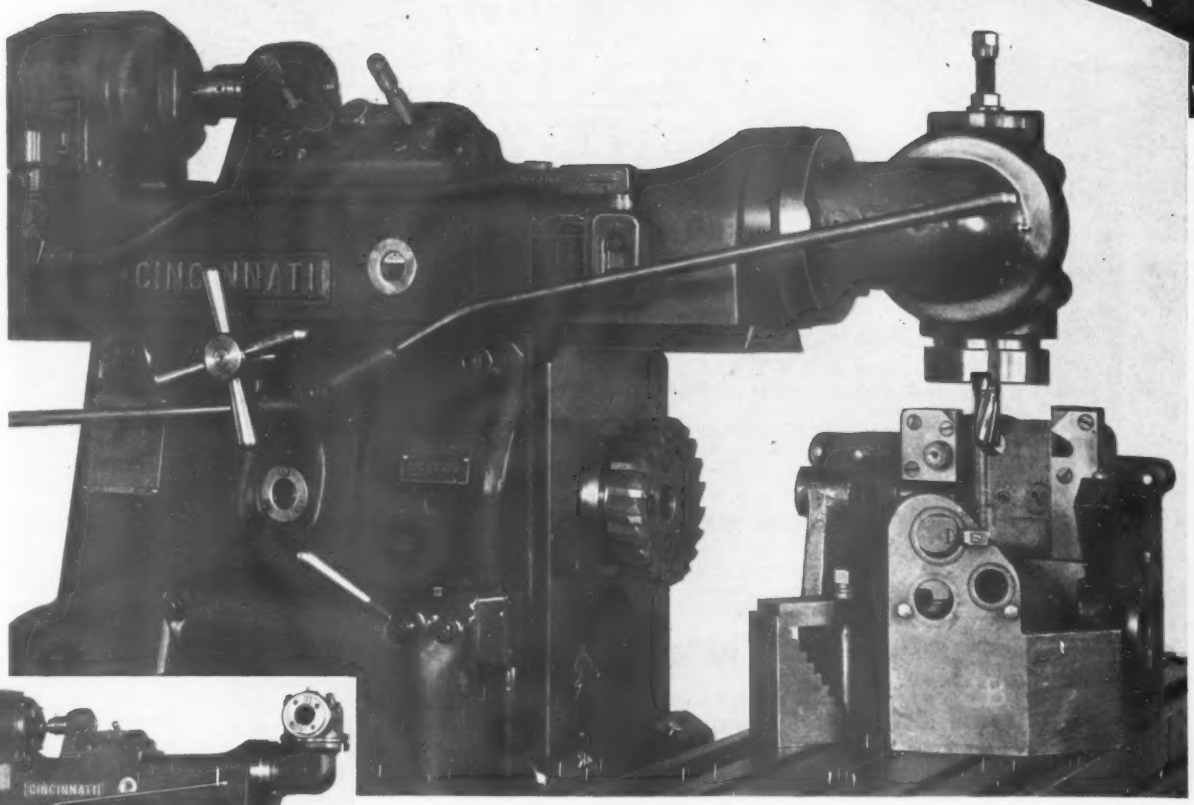
Entrance fee $8.00 to be paid on or before Oct. 5th.

If you are handicapped by "underdeveloped" expression —"Join the Speakers Club and get on your feet."

The operation of Detroit chapter is conducted by the elected officers and heads of the various committees at regular business meetings held on the third Thursday of each month, 7:00 P.M. in the National Offices 5928 Second Boulevard. Chapter members are cordially invited to attend these meetings for the purpose of learning of, or to participate in the conduct of its business.

(Continued on Page 24)





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# OCTOBER CHAPTER MEETINGS

## BRIDGEPORT

October 14, 1937—Hotel Barnum, East Room, 8:00 P.M.

**Meeting:** A sound film on "Industrial Lubrication" will be presented by the Standard Oil Company of the New York Division of the Socony-Vacuum Oil Company, Inc. The meeting will be open for discussion following the showing of the film.

## BUFFALO

October 11, 1937—At the Worthington Pump and Machine Company, Clinton and Roberts Streets. Dinner in the cafeteria at 6:30 P.M., followed by a one hour trip through the plant which will be in full operation. Technical session in the cafeteria, will follow tour.

**Meeting:** There will be three twenty-minute addresses and following these there will be a question forum on subjects of the talks and also on the inspection trip of the plant.

**Subjects: (1) Gas Engines and Compressors (2) Diesel Engines (3) Vee Belt Drives.**

## CHICAGO

October 11, 1937—Machinery Club—571 W. Washington Blvd., Dinner 6:45 P.M., $1.00 per plate. Technical Session at 8:00 P.M.

**Speaker: Mr. T. B. Buell, Sales Manager of the Sundstrand Machine Tool Company, Rockford, Illinois.**

**Subject: Lecture on Sundstrand Equipment.**

Several moving pictures will be shown illustrating the Sundstrand Machines tooled for specific jobs, also special machines. Mail reservations to Chapter Secretary Mr. Willard T. Wilson, 7428 Euclid Avenue, Chicago, Illinois. Please Reserve Early.

## CLEVELAND

October 12, 1937—Colonial Hotel, 523 Prospect Avenue, Cleveland. Dinner 6:30 P.M. Technical session, 8:00 P.M.

**Speaker: Mr. Clinton Johnson of The Pratt & Whitney Company.**

**Subject: "Gages and Gaging Methods."**—Covering Electro-Limit, Light, etc.

Phone C. V. Briner, Cherry 8034, if you will attend. Make reservations early.
Visitors Welcome.

## DETROIT

October 14th, 1937—Inspection trip through the plant of The Great Lakes Steel Corporation, Ecorse, Michigan. There will be no dinner in connection with this meeting. The trip through this, one of the most modern steel plants in the world, will be preceded by moving pictures of the plant and a talk by Mr. J. P. Gatherum, Personnel Director for the Company, at 7:00 P.M. The inspection trip will begin at 7:45 and will require about 2½ hours.

**Make immediate reservations upon receipt of your notice card.**

**Note: Members only are invited to participate. Meeting and trip free.**

## MILWAUKEE

October 14, 1937—Colonial Room, Republican Hotel. Dinner at 6:30 P.M. $1.00 per plate.

**Speaker: Professor Russell E. Oakes (Wisconsin).**

**Subject: "Progress in Science and Ingenious Mechanical Movements."**

Professor Oakes will exhibit and discuss working models of various mechanical movements and show their application to present day machine tool design. Mr. George Smart, Allis Chalmers Mfg. Company, will conduct blackboard discussion. Make Reservations.

## PITTSBURGH

October 8, 1937—"Norse Room," Fort Pitt Hotel. Dinner 6:30 P.M. Technical session 8:00 P.M.

**Speaker: G. H. Fobian, Oil Gear Company, Milwaukee, Wisconsin.**

**Subject: "Hydraulic Feeds for Machine Tools."** (Illustrated.)

Members will be guests of the Barney Machinery Company, Pittsburgh. Make dinner reservations before noon, Friday, October 8, by calling Miss Davenport, Valley 511 or Brandywine 1490.

## ROCKFORD

October 15, 1937—Hotel Faust. Dinner, 6:30 P.M., banquet hall. Technical session, 8:00 P.M. in the lecture room.

**Speakers: Mr. R. R. Weddell and Mr. Malcolm F. Judkins, members of A.S.T.E.**

**Subjects:** Mr. Weddell will speak on **"Tool Engineering and Shop Methods Used in England Today."**

Mr. Judkins will speak on **"The Making of Tungsten Carbide Tools."**

Discussions are invited.

## TOLEDO

October 13, 1937—Toledo Yacht Club. Dinner, 6:30 P.M. Technical session in the Board Room at 7:00 P.M.

**Speaker: Mr. Clinton Johnson, Pratt & Whitney Company.**

**Subject: "Gages and Gaging Procedure in Industry."**

## Chapter Doings

(Continued from Page 20)

### MILWAUKEE

**Emmor E. Houston, Chapter Publicity Chairman**
**1029 South 35th Street, Milwaukee, Wisconsin**

The first meeting of the Milwaukee Chapter's new fall series of dinner meetings was held Thursday, September 9, 1937, at the Republican Hotel.

Chairman George A. Smart welcomed a large enthusiastic gathering and then introduced the principal speaker of the evening, Dean F. A. Kartak, of the College of Engineering, Marquette University. His subject was: "A Visual Demonstration of the Fibre Stresses of Material."

Dean Kartak pointed out that the "polariscope" or instrument employing polarized light can be of great service to the tool designer; that is, if a scale model in celluloid or transparent bakelite is made of the contemplated design and then subjected under pressure to the scrutiny of the polariscope the strain will be easily discernible and can then be eliminated in the actual tool.

Our hats are off to the Cutler-Hammer Tool Engineers for their fine turn out which was practically 100 percent.

We are happy to report that Brother Dussault has recovered from injuries received in an automobile accident recently.

Without joking, we believe some of the boys who gathered in the Tap Room after the meeting could form a well balanced Octette. The boys were harmonizing on all types of songs from Grand Opera down.

Judging from the comments of the members after the meeting, most of the boys are in favor of short, snappy, interesting meetings, such as the one they had just enjoyed.

Let's all go to the next meeting, October 14th, and make it bigger and better than ever.

### ROCKFORD

**Herbert O. Olsen, Chapter Secretary**
**1016 Seventh Street, Rockford, Ill.**

The Rockford Chapter No. 12 of the American Society of Tool Engineers was organized and chartered at an enthusiastic meeting held Friday, September 10th, at the Faust Hotel in Rockford, Illinois. National officers present were C. Ray Brunner, Dodge Brothers, Secretary; A. M. Sargent, Pioneer Engineering & Mfg. Co., Director and former Secretary; and also Ford R. Lamb, Executive Secretary. H. D. Hiatt, formerly with Nash Motors Company and former Chairman of the Racine Chapter No. 2, now with Latrobe Tool Company, Chicago, accompanied the National officers and took part in the program.

The after dinner program which preceded the organization meeting was well arranged and ably handled by Toastmaster Barney Thompson, Editor of Rockford Newspapers and included a speech of welcome by Mayor Charles P. Brown. Toasts of Greeting and Welcome to the new Tool Engineering Chapter by J. H. Mansfield, Chairman of the Rock River valley chapters of American Society of Mechanical Engineers, J. J. Burns, Chairman, Rockford Chapter, American Society of Metals, and Gust Johnson, Vice-President, Rockford Engineering Society.

This new chapter was chartered with one hundred and sixteen charter members making Rockford No. 12 have the largest group of charter members outside of the Detroit Parent chapter. Rockford being second in the country in production of machine tools holds a very important place in Industry and Mass production. It is expected that the Rockford Chapter will contribute much of value to the science of Tool Engineering to The Society and to the development of the profession.

The success of the organization meeting was due almost entirely to the interest and work of the committee of Tool Engineers in Rock-

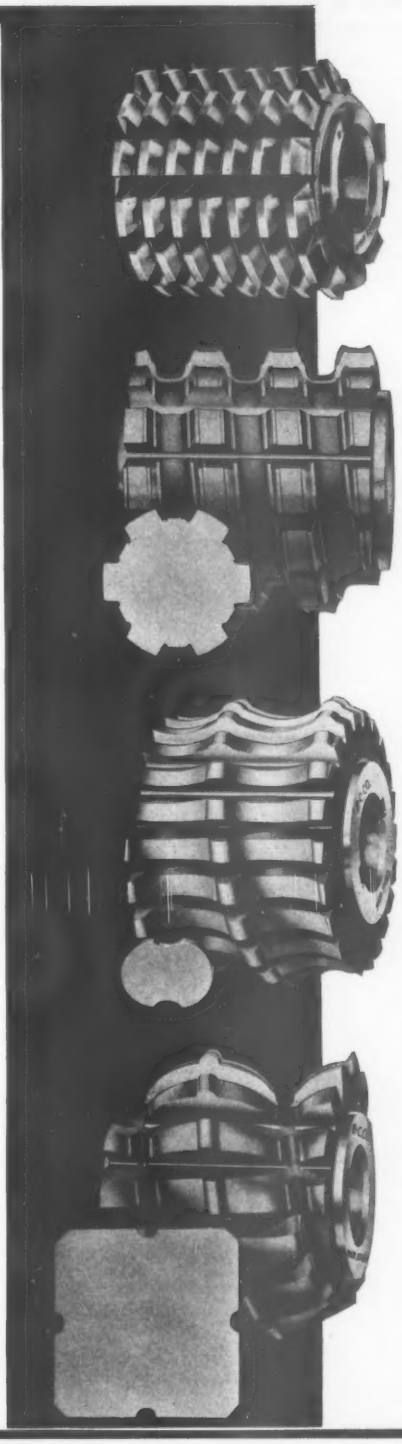
(Continued on Page 42)

# Use BARBER-COLMAN GROUND HOBS

## For Accuracy, Service, Value

For greatest accuracy, uniformity and finest finish in the product . . . use ground hobs. For long tool-life, exact duplication of replacements, and greatest value per dollar of investment . . . use ground hobs.

Barber-Colman metallurgical research prescribes steel of special analysis exactly suited to specific hobbing conditions. Extensive use of hobbing in our own plant, and the manufacture of hobbing machines as well as hobs, qualifies Barber-Colman engineers to render expert advice and service. Special machines and carefully trained men are employed exclusively in the production of Barber-Colman ground hobs. Result, Barber-Colman hobs—ground or unground—are unexcelled in quality and value per dollar of purchase price. The unground hobs are perfectly satisfactory for ordinary work. When extreme accuracy and fine finish are required, ground hobs should be used; and this can be done most economically when Barber-Colman Hobs are selected. Try Barber-Colman Ground Hobs on your most exacting work . . . and if you have an unsolved hobbing problem, let Barber-Colman engineers figure on the answer.



Ground Hobs for gears, sprockets, ratchets, and similar parts having any practical tooth form or pitch.

Ground Hobs for spline shafts in any size, shape, and number of splines that can be hobbed.

Ground Hobs for curved shapes. Hob shown is for an impeller section requiring high accuracy and fine finish.

Ground Hob for straight-sided heading die. Note curved surfaces on tooth form, all finished accurately by grinding.

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610 West Michigan St.

# HANDY ANDY'S ..WORKSHOP..

The late fluctuations in the stock market have given rise to considerable speculation regarding another depression. Well, it could happen, although there is no valid reason why it should happen. Wall Street has never created a penny of wealth; industry and labor create that, with the engineers leading the way to new heights of mechanical and industrial progress.

Depressions are, after all, manifestations of fear; the antidote is courage to go ahead. By sheer courage to cite an example, the automotive industry led the way out of the last depression, producing better cars at lower prices despite rising costs of labor and material. It showed what can be done; still sets the pace.

Right now, industry is geared for the biggest boom in history, and it is up to us Tool Engineers to devise ways of processing manufactured goods so cheaply yet to such high standards of quality that people will just have to buy. The world loves a bargain, be it a better automobile, a stunning dress or an improved washing machine. The market is there, so, let's produce the goods and make Wall Street juggling of stocks and bonds a futile gesture. Let's go!

I have just been going over the reports from the various chapters, and as usual am impressed with the enthusiasm with which the boys North East West South carry on. Rockford Chapter got off to a fine start, and somehow I think that we're going to hear from that neck of the woods. Rockford engineers have been setting a fast pace for a number of years now, and competition is good for everybody. However, we're all in fast company, as attested by the way this man's outfit is growing.

You know, I'm beginning to think that A.S.T.Eer Otto Winter is the real go-getter of the Society. About every time I pick up a technical journal I see his name or picture somewhere, and now I see where Buffalo Chapter has made him publicity chairman. Well, he knows his ropes, and I predict that Buffalo will be heard from. No use hiding our light under a bushel; let's spread it for all the world to see.

The Milwaukee boys seem to have a pretty thorough grasp of the functions of the Board of Directors, also, of the ways national finances are disposed. From personal contacts, I can say that the attitude of the Board of Directors is highly cooperative, with the bias, if anything, favoring the remote Chapters. This despite that, so far, Detroit men have predominated on the board. However, it is that cooperative spirit, that mutual recognition of the qualities of the men elected to the Directorate — mutual confidence — that has been mainly responsible for the Society's growth. We have common problems; we unite to solve them.

To reiterate a previous statement, I know of no other professional body that gives so much for so little. Our dues are nominal in the extreme, and the remarkable thing is that we have been able to carry on, and grow, within the limits of our finances. That is truly a tribute to the men who have guided the destinies of the Society, men who have worked faithfully and enthusiastically, often at personal sacrifice and at direct personal expense, to spread the gospel of good Tool Engineering. And, like virtue, the work is often its own reward.

From one thing to another did you ever stop to consider the value of criticism as a factor in personal progress? Yet, one of the hardest things to get is unprejudiced criticism which, in the final analysis, is constructive criticism. To most people, criticism of any sort is hard

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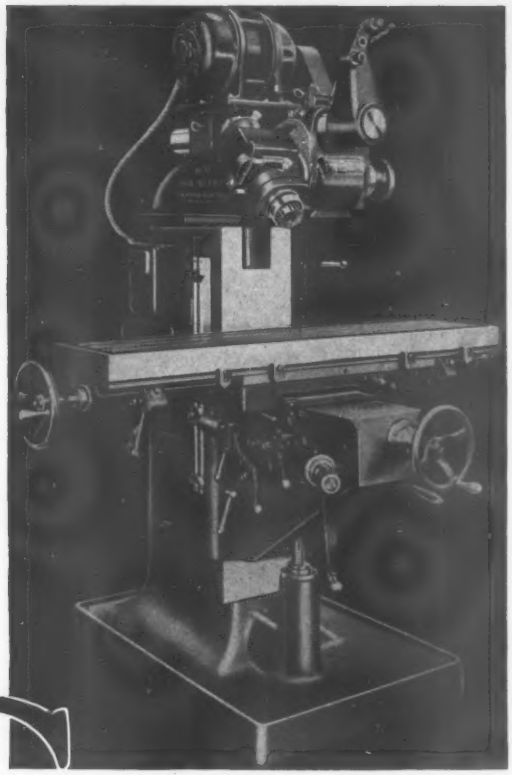


CUT down on tool-up costs. Save set-ups, speed up output, eliminate errors. Put in a Van Norman Universal Miller that finishes 9 out of 10 toolroom milling jobs in one set-up—no matter how many operations are required. Swiveling cutterhead and sliding ram give these machines a work-range that includes horizontal, vertical, angular milling. Boring, slotting, drilling, routing. Spiral and compound angle cutting. For any toolroom, contract, experimental or pattern jobs that require many operations, Van Norman Universal Millers can usually save at least 50% of the customary set-up time. Write today for complete information.

# VAN NORMAN

**VAN NORMAN MACHINE TOOL CO.,** *Springfield, Mass.*

## HANDY ANDY'S ..WORKSHOP..

The late fluctuations in the stock market have given rise to considerable speculation regarding another depression. Well, it could happen, although there is no valid reason why it should happen. Wall Street has never created a penny of wealth; industry and labor create that, with the engineers leading the way to new heights of mechanical and industrial progress.

Depressions are, after all, manifestations of fear; the antidote is courage to go ahead. By sheer courage to cite an example, the automotive industry led the way out of the last depression, producing better cars at lower prices despite rising costs of labor and material. It showed what can be done; still sets the pace.

Right now, industry is geared for the biggest boom in history, and it is up to us Tool Engineers to devise ways of processing manufactured goods so cheaply yet to such high standards of quality that people will just have to buy. The world loves a bargain, be it a better automobile, a stunning dress or an improved washing machine. The market is there, so, let's produce the goods and make Wall Street juggling of stocks and bonds a futile gesture. Let's go!

I have just been going over the reports from the various chapters, and as usual am impressed with the enthusiasm with which the boys North East West South carry on. Rockford Chapter got off to a fine start, and somehow I think that we're going to hear from that neck of the woods. Rockford engineers have been setting a fast pace for a number of years now, and competition is good for everybody. However, we're all in fast company, as attested by the way this man's outfit is growing.

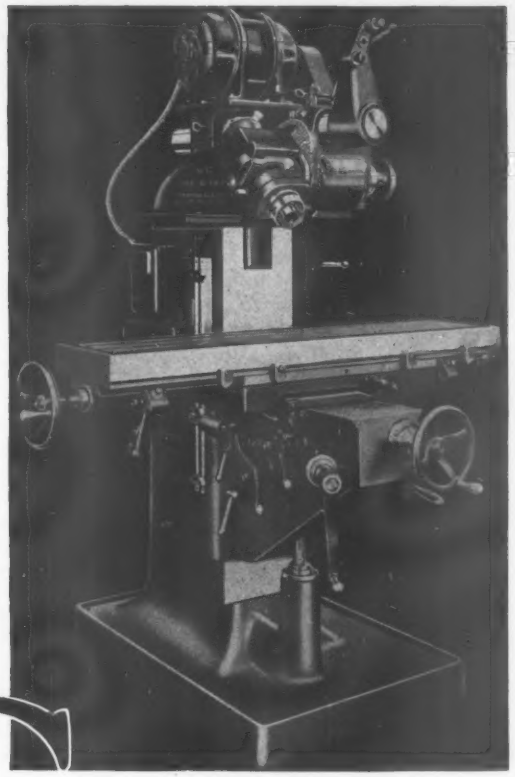
You know, I'm beginning to think that A.S.T.Eer Otto Winter is the real go-getter of the Society. About every time I pick up a technical journal I see his name or picture somewhere, and now I see where Buffalo Chapter has made him publicity chairman. Well, he knows his ropes, and I predict that Buffalo will be heard from. No use hiding our light under a bushel; let's spread it for all the world to see.

The Milwaukee boys seem to have a pretty thorough grasp of the functions of the Board of Directors, also, of the ways national finances are disposed. From personal contacts, I can say that the attitude of the Board of Directors is highly cooperative, with the bias, if anything, favoring the remote Chapters. This despite that, so far, Detroit men have predominated on the board. However, it is that cooperative spirit, that mutual recognition of the qualities of the men elected to the Directorate — mutual confidence — that has been mainly responsible for the Society's growth. We have common problems; we unite to solve them.

To reiterate a previous statement, I know of no other professional body that gives so much for so little. Our dues are nominal in the extreme, and the remarkable thing is that we have been able to carry on, and grow, within the limits of our finances. That is truly a tribute to the men who have guided the destinies of the Society, men who have worked faithfully and enthusiastically, often at personal sacrifice and at direct personal expense, to spread the gospel of good Tool Engineering. And, like virtue, the work is often its own reward.

From one thing to another did you ever stop to consider the value of criticism as a factor in personal progress? Yet, one of the hardest things to get is unprejudiced criticism which, in the final analysis, is constructive criticism. To most people, criticism of any sort is hard

(Continued on Page 49)



CUT down on tool-up costs. Save set-ups, speed up output, eliminate errors. Put in a Van Norman Universal Miller that finishes 9 out of 10 toolroom milling jobs in one set-up—no matter how many operations are required. Swiveling cutterhead and sliding ram give these machines a work-range that includes horizontal, vertical, angular milling. Boring, slotting, drilling, routing. Spiral and compound angle cutting. For any toolroom, contract, experimental or pattern jobs that require many operations, Van Norman Universal Millers can usually save at least 50% of the customary set-up time. Write today for complete information.

# VAN NORMAN

**VAN NORMAN MACHINE TOOL CO.,** *Springfield, Mass.*

## Production Perspectives

(Continued from Page 18)

**man for the Boston & Albany** railroad at West Springfield, **retired Sept. 15 after completing nearly 58 years of continuous service,** 33 of which have been in a supervisory capacity. On August 26 Mr. Rogers **celebrated his 71st birthday.**

**Joseph Harper,** treasurer of both the **Harper Screw Products Corp.** and **the Parker & Harper Mfg. Co.,** Inc., **Worcester, with Mrs. Harper celebrated their 50th wedding anniversary, Sept. 12.**

**John J. Duggan, president of Chapman Valve Co., Springfield, was guest of honor at the employes' outing at Turner Park** recently.

More than **250 members of the Independent Association** of **Small Tool Workers, Greenfield** Tap and Die employes' union, **enjoyed a clambake and outing at the Turners Falls** Scheutzen Verein camp on the Connecticut River at Gill recently. **Col. Frederick H. Payne,** chairman of the board of directors, vice-president and general manager **Francis A. Smith** and Assistant Superintendent **Earl R. Koonz were among the company officials attending.**

**Industrial employment maintained high levels in Connecticut** during September, **with the Bridgeport Manufacturers Association reporting a total of 19,284 for the week ended September 4, a new high record.** Man hours dropped fractionally. **New Haven reported a new record** total during August, **with 1,672 more on payrolls than a year ago.** Intense **heat during August caused brief shutdowns** in a few plants, **but not enough to affect production materially.** The **Export Managers Club of Bridgeport announced** September 11 **that last year's total of $5,000,000 worth of Bridgeport products shipped abroad would be exceeded this year.**

**Need for additional manufacturing facilities** or for space to install replacement equipment **has resulted in many plant expansion programs.** Recent additions to the list include **United Aircraft Corp., East Hartford,** erecting a water brake test house structure to cost $30,000; **Remington Arms Co., Bridgeport,** addition to rim-fire cartridge division, one story, $52,000; **A. C. Gilbert Co., New Haven,** three stories; **Heppenstall Forge Co., Bridgeport,** one story, steel and frame; **Fuller Brush Co., Hartford,** addition for broom and punch press department, 26,828 square feet, $85,000; **Wallingford Steel Co., Wallingford,** for storage and shipping, $45,000; **Greist Mfg. Co., New Haven,** small addition, $4,000, and **Eagle Lock Co., Terryville,** steel and concrete tower, replacing four-story wooden tower . . **Automatic Signal Corp., New York City,** has established its plant in the former **Standard Safety Razor Co. factory, Norwalk . . . Consolidation of Air Devices Corp.** with **Connecticut Telephone & Electric Corp., Meriden,** has **resulted in transfer of all A. D. manufacturing operations to Meriden, with Hal P. Shearer, C. T. & E. president, in charge of all production . . . Newton H. Hoyt,** comptroller of **Singer Mfg. Co., Bridgeport,** has been **named works manager succeeding George M. Eames,** who died September 4, aged 78. **Robert W. Stewart** becomes **assistant works manager . . . George W. Campbell, general works manager, Hartford plant, Underwood-Elliott-Fisher** Co., **died August 30** . . . . Other **recent deaths** in the Connecticut manufacturing field include **George R. Bott, chief engineer, Norma - Hoffman Bearings Corp., Stamford,** and **P. Gustave Israelson, a superintendent at Bullard Co.** plant, **Bridgeport** . . . . **The old "Wheel Shop" at Guilford, recently leased by New Haven Clock Co., New Haven, will be used by that company for production of parts for a new type of electrically-wound automobile clock,** using but 6 volts instead of 110 . . . **Recent** government **War Department contracts include: Scovill Mfg. Co.,** Waterbury, brass discs, $217,000; **Chase Brass & Copper Co.,** Waterbury, brass discs, $120,000; **Manning, Maxwell & Moore Co.,** Inc., Bridgeport, gauge units and thermostatic assemblies used in airplane construction, $47,310. The Scovill company also has

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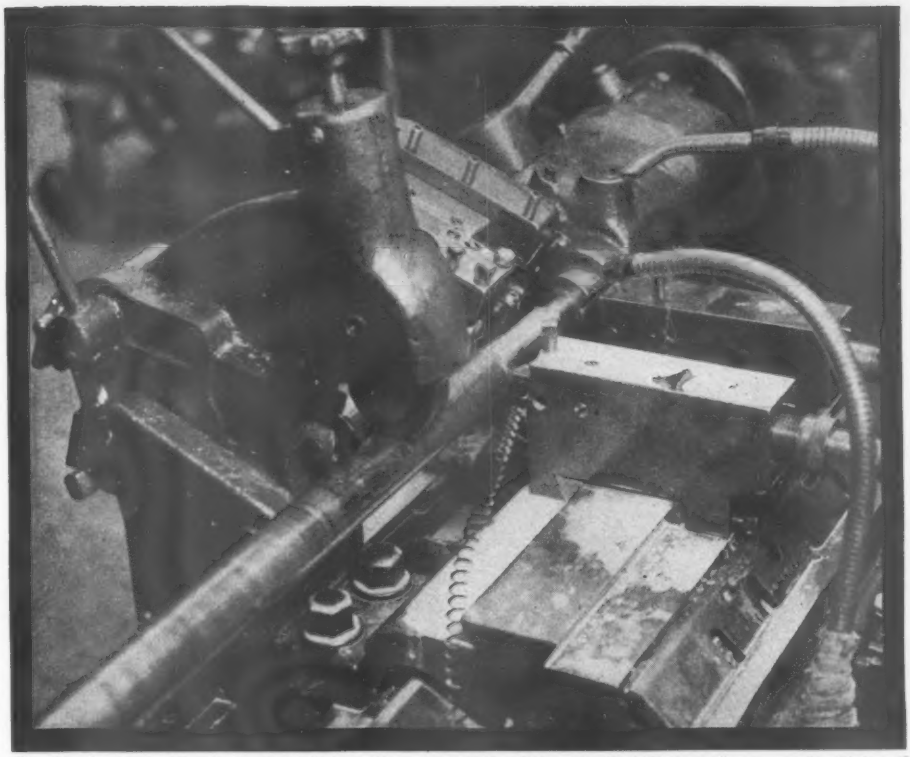

*Turning front propeller shaft 45 5/16" long, diameter 1.490". Material: S. A. E. 3140, heat treated to Brinnell hardness of 302 to 340. Operations: turn 5" on outer diameter and chamfer 60° on turned end. Comparative performance of V-R Grade E and H.S.S. tools:*

| Tools Used | Depth of Cut | Feed | Speed | Pieces per Grind |
|---|---|---|---|---|
| V-R Grade E | .109" | .015" | 123 Ft./M | 600 to 800 |
| H.S.S. | .109" | .010" | 35 Ft./M | 3 to 10 |

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San Francisco . . . . Calif.

## The Spice of Life

(Continued from Page 13)

in the figure. The ingots themselves are held in a 3 cylinder compressed air operated fixture. Feed rates are available from 4" to 8" a minute. The chip conveyor on this machine is of the screw type which is practical with the very heavy, short, thick chips produced. This machine is also used to scalp smaller ingots of inconel, a much harder but somewhat less tough nickel alloy. The feed box is located at one end of the bed and drives the table through a single thread lead screw.

With the exception of this latter briefly described scalper, all machines illustrated have been characterized by unusually high feed rates and by cutting speeds higher than usually encountered in normal milling. There have been built, of course, many large and interesting milling machines which do not employ such exceptional speeds and feeds but which, because of design, rigidity, or power available, are able to do difficult work much better and faster than by any other method.

The machine shown in Figure 6 is an excellent example of a very large special purpose milling machine which is doing a rather common type of work in a rather uncommon manner. It is designed for machining the air duct, winding, and ventilating slots in large rotors such as are found on turbo generators. These rotors are alloy steel forgings heat treated to give an elastic limit of 80,000 lbs. per square inch and a scleroscope hardness of 40 to 41. The machine is designed to cut two opposed slots at once, climb cutting, and will mill a slot $7\frac{13}{16}$" deep x 1.46" wide at a feed rate of 1" per minute. Each head has its own control panel visible in the figure, containing a meter giving the load on the drive motor. The motor is a 20 h.p. D.C. The feed on the machine is again variable by means of an adjustable speed motor and may be changed during the cut. The table drive mechanism while not visible in the figure is of unusual design, being in the form of two worms operating in a curved rack attached to the bottom of the table. The position of the two worms may be adjusted upon their common shaft to take up all back lash and give required steadiness to the table feed when taking heavy climb cuts. The slotting cutters used range to about 30 inches in diameter and a swinging loading arm is provided to facilitate changing cutter. The close-up view shown does not adequately show the size of this machine. Its net weight is 330,000 pounds and it will slot rotors 40 ft. long, 5 ft. 3 inches in diameter and weighing 320,000 pounds as they come to the machine.



## Production Perspectives

(Continued from Page 28)

a Treasury Department contract for $53,750 worth of nickel blanks . . . **E. W. Carpenter,** former head of E. W. Carpenter Mfg. Co., Bridgeport, tools and shears, **has formed a new company, Carpenter Products Co., Inc.,** which has leased 15,000 square feet of floor space at Washburn and Carbon streets, Bridgeport . . . **Shipments of Segal Lock Co.,** Stamford, for the first seven months of 1937 **showed an increase of 22 per cent over the same period last year . . . Maxim Silencer Co., Hartford, reports more orders for silencers to be used on large size Diesel engines.** . . . Valve production of **Reading-Pratt & Cady Co.,** Inc., **Hartford,** is reported **well ahead of last year . . . Manning-Bowman Co., Meriden,** has **introduced several new electric appliances,** a line of **glass coffeemakers** and a new line of **sculptured aluminum with permanent ceramic finish.**

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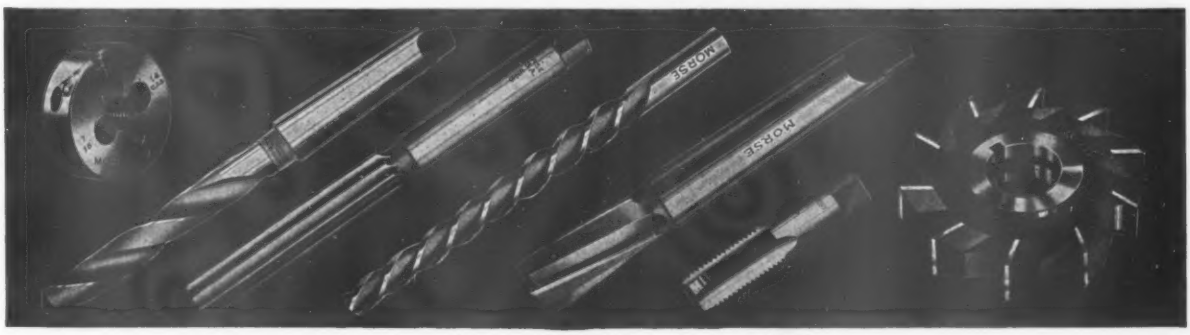

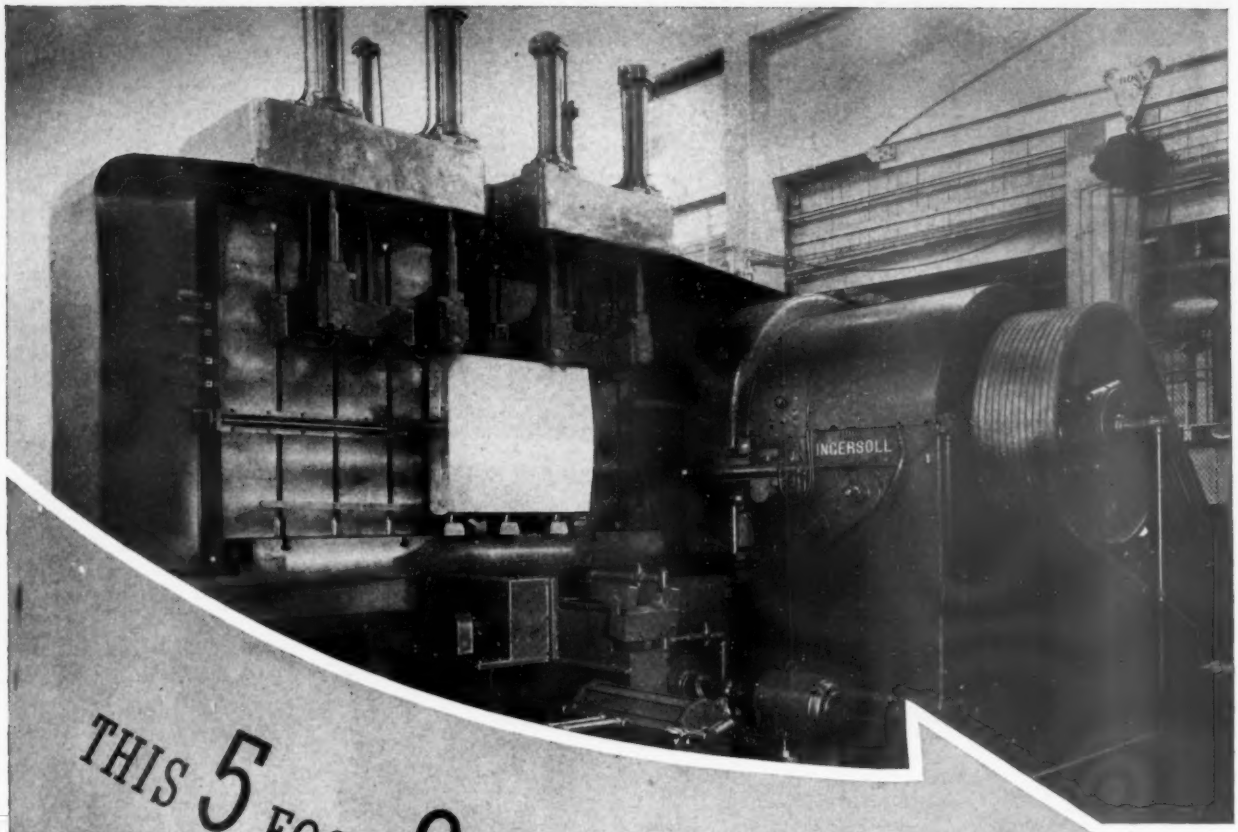


# THIS 5 FOOT 8 INCH FIRTHITE CUTTER

## HAS 64 FIRTHITE BLADES

"HOLLYWOOD" superlatives are required to properly describe this truly huge Ingersoll Milling Cutter which is equipped with 64 FIRTHITE tipped inserted blades. This is probably the largest Carbide Tipped face milling cutter ever assembled. Its outside diameter is 68 inches and it slabs aluminum ingots up to 66 inches wide. A 150 H.P. motor drives it at *3000 ft. per minute.* Removing *3/16" of stock* per pass at feed rates up to *72" per minute.* 60 blades do the roughing while 4 blades set 90 degrees apart and ahead on the face on a smaller diameter do the finishing. These 4 finishing blades have wide faced FIRTHITE tipped cutting edges to sweep the milled surface smooth and flat to prepare the ingot for the subsequent rolling and drawing operations.

This cutter effectually proves that size imposes no limitation on the use of FIRTHITE Sintered Carbide tipped tools. FIRTHITE helped make this unusual application possible. FIRTHITE also helps to make all cutting tools from single point turning tools to intricate fluted types more efficient and durable.

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**The Engineer in a Changing World**

(Continued from Page 16)

nonexistent when Queen Victoria began her reign.

There is no need to multiply instances. The tale has been told and retold; but told and retold, as well, has been the story of the problems an engineering civilization has posed for the solution of its citizens. The perils of drought and pestilence have been exchanged for the mischances of technological unemployment. That unemployment may be transitory and a part of a process which history shows to be benevolent in its total results, but it is as yet a serious and sometimes insoluble personal problem.

Worst of all, our engineering civilization proves to be less stable than the older forms based upon subsistence agriculture. It gives us more, but its gifts are more irregular. There are seasons of outpouring and seasons of withholding. Boom follows depression, and depression follows boom, and this relentless alternation leaves much human wreckage in its wake. What can and should we engineers do about the evil features we have made?



**Engineers Should Not Intrude Into Alien Fields**

It is not my intention to go into the details of this problem. I believe that the engineer's work has been healthy and constructive. I believe that the maladjustments have come from our narrow and selfish activities as industrialists, workers, farmers, and financiers, and from the imbecilities of our politics. In particular, I do not believe, as so many have urged, that the remedy lies in the intrusion of engineers with engineering methods into the alien fields of politics, economics, and finance. This subject will be discussed briefly, because in popular opinion our profession alternately has been damned for causing all the ills of our era on the one hand, and on the other for not curing them by still more radical engineering activity.

This question was raised some months ago in an address by Walter Lippmann, and I take the liberty of quoting here in part from his criticisms and in part from a reply to them:

> There were several years, I should say roughly from the crash of 1929 to the end of 1933, from the breakdown of prosperity to the beginning of recovery, when the ideal of an engineered and planned economy had almost completely captured the imagination of the Western World. Every one who raised his voice—the Chamber of Commerce, the heads of big corporations as well as the New Dealers and the Progressives—talked about planning something. No doubt they had different ideas of how to plan and what to plan for, but the underlying image dominated most minds. The notion finally reached its grand climax, and its reductio ad absurdum, in the vogue of technocracy.
>
> The point I wish to make is that the conception of government as a problem in engineering is a false and misleading conception, that the image of the engineer is not a true image of a statesman, and that society cannot be planned and engineered as if it were a building, a machine, or a ship. The reason why the engineering image is a bad image in politics, a bad working model for political thought, a bad pattern to have in mind when dealing with political issues, is a very simple one. The engineer deals with inanimate materials. The statesman deals with the behavior of persons.
>
> The notion that society can be engineered, planned, fabricated, as if men were inanimate materials, becomes in its extremist manifestations a monstrous blasphemy against life itself.

These statements are a challenge to the engineer's training, his state of mind, and his usefulness to society. That challenge should be accepted and an answer given.

**Engineer Can Contribute to Government**

Engineers never have been convinced, in great numbers or for long,

(Continued on Page 36)

## The Engineer in a Changing World

(Continued from Page 34)

of the effectiveness of their technique as a main reliance of government. In fact, the clearest, most reasoned, most convincing demonstration of its inapplicability is the work of an engineer. Those interested will find it in an article by David Cushman Coyle entitled "The Twilight of National Planning," published in Harper's Magazine for October 1935. In all this we are at one with Mr. Lippmann.

But it will not do to leave the matter in this negative state. The engineer has positive contributions to make to the processes of effective government. He cannot make them unless certain misconceptions expressed in Mr. Lippmann's address are removed and the real nature of his contribution is revealed. There are 2 primary misconceptions: (1) The engineer cannot "dictate to nature." He is the humble disciple of nature, serving society by virtue of that discipleship. (2) His undertakings grow ever farther removed from the completely material realm and must perforce deal ever more and more with the realization of human ends, whereby the completed structure or mechanism is a joint product of material science on the one hand, and human desires, needs, and possibilities on the other. In no branch of engineering does this appear more clearly than in the modern forms of "scientific management," of which the foundation is a fundamental and sincere comprehension of the human and personal element. Engineering is science applied to human needs. It is both a science and an art. If it is not both, it is not engineering.

Another characteristic of engineering is derived from the fact that it is an applied science. It is science applied to definite purposes; and definition of the purpose becomes the ruling factor in engineering design. In government a similar definition of fundamental purpose is sadly needed. Our national policies are guided by such secondary and derivative purposes as raising the price level, restoring the freedom of international trade, raising wages, shortening hours, controlling production, restraining competition. Each of these confidently is put forward as a good in itself, with small pains taken to see that each is related to some larger, general set of purposes.

Good engineering is based upon a careful statement of the problem to be solved; and it happens that our profession has formulated such a statement of the economic problem and has publicly offered it for the consideration of government and governed. It is to be found in the first progress report of the committee on economic balance of American Engineering Council. It reads as follows:

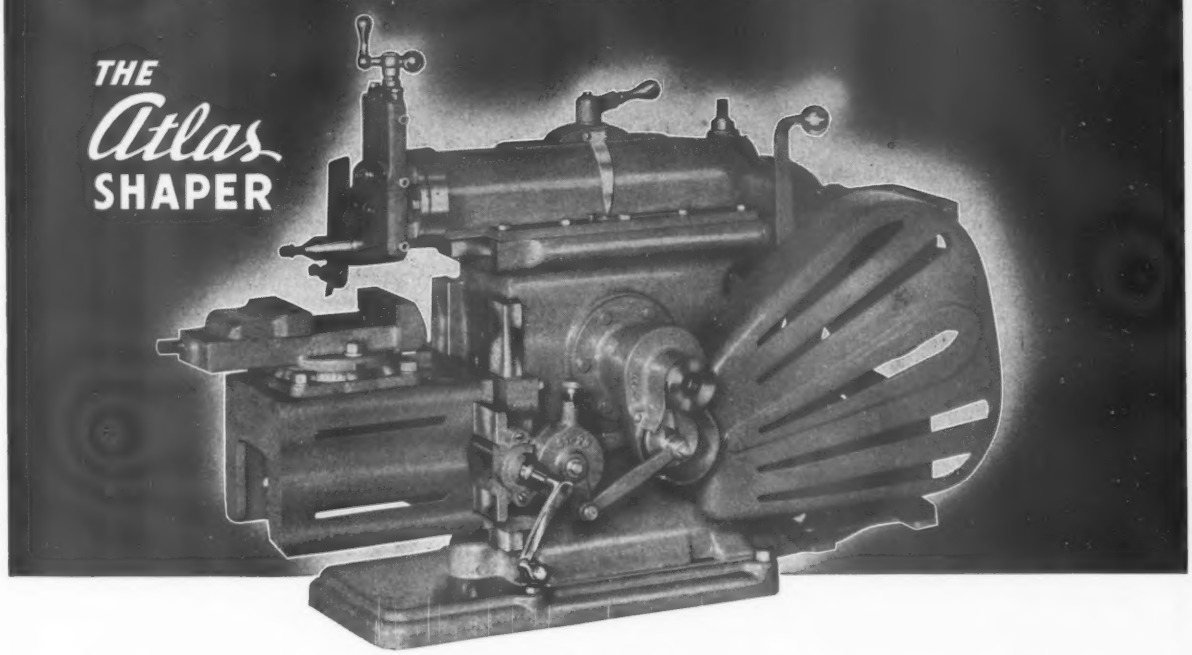
> The problem is "the selection and recommendation of such governmental, financial, and business policies as will maintain in the United States a standard of living that is high, broadly distributed, and free from severe fluctuations."

At first sight such a statement appears trite and sterile; but when we take the trouble to examine the infinitude of partial and conflicting policies that go to make up our total program at this moment, the need becomes clear for some such statement of fundamental purposes, to which all policies must be referred.

A third contribution of our profession—and the last to be suggested in this connection—is a certain knowledge, and a particular faith. The knowledge is that the physical requirements are now at hand for a material standard of living far higher than the human race ever before has enjoyed. There are

(Continued on Page 38)

# Atlas ANNOUNCES A MODERN PRECISION 7" SHAPER FOR TOOL ROOM AND SHOP

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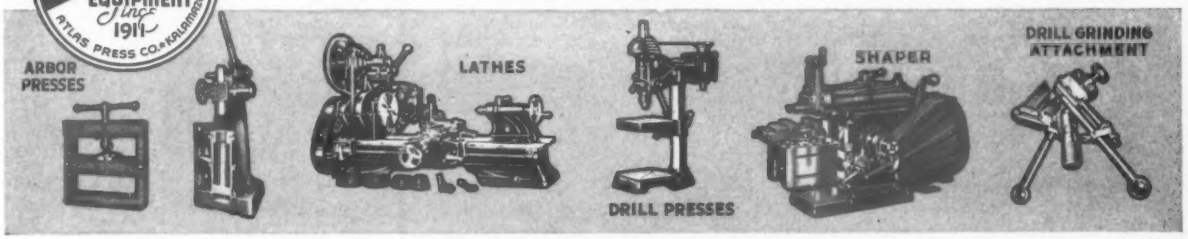

**The Engineer in a Changing World**

(Continued from Page 36)

no physical obstacles. The engineer has removed them. He has played his part. If fault there be, it lies at some other door than his.

With the knowledge goes a faith. He has faith that the complicated social and political problems involved in reaching our objective can be solved—not immediately nor completely, but in such wise and with such speed as may lead to a continuance of our old progress toward a higher and more widely distributed material prosperity. This knowledge and this faith we would share with others.

It is a privilege to belong to a profession that combines the practice of a science and an art. The combination is essential for leadership and achievement. For some time, it has seemed that at least 3 branches of education and professional practice are well fitted to prepare men for life in our present troubled world. They are the doctors, the engineers (to an extent and for reasons I have endeavored to explain), and the graduates of the first-rank schools of business administration, together with the practitioners of business who have attained professional first rank without grace of formal education.

Not only is each of these professions at once a science and an art, but they have another property in common. Each has to face the harsh judgment of ascertainable fact. For the doctor, the patient gets worse or better, lives or dies. For the engineer, the dam endures and serves its economic purposes, or it goes out under the pressure of the flood, scattering death and destruction. The business man faces the grim entries on the balance sheet. Each is in touch with reality. Society needs the touch of reality.

How should all this affect our lives and our actions? In many ways, but principally in 2 ways: We should derive from these considerations a deep and effective sense of the worth of our profession, and likewise of the responsibilities we bear as engineers.

### A Current Problem As the Engineer Sees It

It may be worth while to consider one of our current problems in the light of the engineer's knowledge and experience. We believe that the standard of living may be greatly raised for the mass of the population which is able and willing to work. We believe also that the increasing efficiency of machinery, processes, and management will permit the world's work to be done in shorter hours with more leisure for rational enjoyment. In a word we are sympathetic with and committed to the objectives of the present active labor movement in its endeavor to attain shorter hours and higher wages.

But the higher wages must be real wages, that is to say, they must be able to purchase more goods and services for the wage earner and his family. A mere increase in dollar wages will not do if there are no more goods and services to be bought and if prices advance as fast as or faster than wages do. When we see output restricted by shorter hours and the slowing up of the introduction of improved machinery, while wages are being raised, we are justified as engineers in applying elementary analysis to the problem. We must conclude on such analysis that it is hopeless to expect more goods for higher wages if less goods per worker are made. The hope for a better living under those circumstances is illusory and cruelly deceptive.

(Continued on Page 40)

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**The Engineer in a Changing World**

(Continued from Page 38)

However, there is hope for a better living, and that better living can come only from better production as a preliminary to better distribution. For that better production — and particularly for better production in shorter hours—the world is now, and in the future will be, dependent on the engineer, as it has been in the past. If our hopes for better material conditions are to be realized, there will be work for the research engineer, for the process engineer, for the designing engineer, for the management engineer. And the sooner this is realized by the protagonists in our present social strife the better it will be for all concerned.

**A Major Threat to Social Progress**

It is in our experience and our present method of meeting these current problems that we find the engineer's responsibilities of today. By the pressure of attractive but impossible doctrine, his usefulness to society is threatened; and with the limiting of his usefulness, there is arising a major threat to the social progress we have been making hitherto. We cannot ignore this situation. We must exercise our responsibility more for the sake of society as a whole than for the sake of ourselves as individual engineers or for the private interests of the businesses with which we may be connected.

There is indeed danger in the fact that the material progress with which we are concerned is so closely associated with business interests that they may seem to be one and the same thing. They are not completely so. There is a large area of business as it has been pursued in years past that has not been socially constructive, but socially dangerous instead. Perhaps the largest single area of this harmful business activity has been found in the realm of security speculation and its allied enterprises. Unfortunately for one area of our responsibility, this speculative activity has been so closely associated with the operation of utilities that it is difficult for the general public to distinguish between the useful and socially necessary on the one hand, and the destructive and damnable on the other. A part of our problem lies in making this distinction clear within our own minds and then in presenting the distinction so clearly that we can take the lead as individual engineers in directing public policy on this utilities question into channels more nearly serving the public interest than does the direction now being pursued.

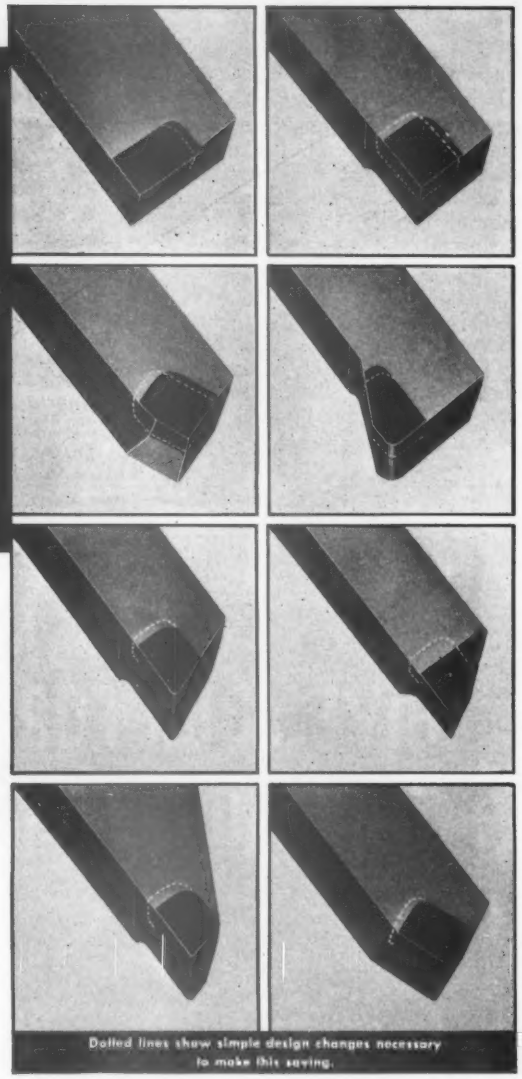
Another danger that we must carefully avoid is that of running wild on the social and economic aspects of our profession and neglecting the technical foundation on which is built everything else that we say and do. The other serious danger, that we may be rash enough to carry our whole engineering point of view over into social planning, has already been discussed.

Whether or not as individuals or as a profession we attain to high reputation or only to humble usefulness, we know that our civilization depends on us. In the words of Spengler, though with more hopeful emphasis:

> The center of this artificial and complicated realm of the machine is the organized and manager. The mind, not the hand, holds it together. But, for that very reason, to preserve the ever-endangered structure, one figure is even more important than all the energy of enterprising master-men that make cities to grow out of the ground and alter the picture of the landscape; it is a figure that is apt to be forgotten in this conflict of politics—the engineer, the priest of the machine, the man who knows it. Not merely the importance, but the very existence of the industry depends upon the existence of the hundred thousand talented, rigorously schooled brains that command the technique and develop it onward and onward. The quiet engineer it is who is the machine's master and destiny. His thought is as possibility what the machine is as actuality.

(Continued on Page 44)

# ONE PLANT *Saved* $8.80 ON THE COST OF CARBOLOY FOR THESE EIGHT TOOLS



Dotted lines show simple design changes necessary to make this saving.

Standard Blank No. R-229. Size 5/32 x 3/8 x 9/16. This is one of 3 styles and 152 sizes of standard blanks now available.

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## Chapter Doings

(Continued from Page 24)

ford and Beloit who contributed so freely their time and effort, and these men deserve the thanks of the Society. E. W. Dickett, Sundstrand Machine Tool Co.; H. J. Caldwell, Barnes Drill Co.; H. A. Dovers, Fairbanks Morse Co.; Don Hawkinson, Greenlee Bros. & Co.; J. W. Hoss, Warner Electric Brake Co.; George Johnson, W. F. & John Barnes Co.; K. W. Lund, Ingersoll Milling Machine Co.; Herbert O. Olson, Barber Colman Co.; Henry Sandell, Ingersoll Milling Machine Co., and George Sorensen, Jr., Woodward Governor Co., were the members of the committee who did a good job.

### Baltimore to Charter A.S.T.E. Chapter October 13th

**A group of Tool Engineers from Baltimore and nearby has organized a chapter of the American Society of Tool Engineers. This will be chapter No. 14. Arrangements have been completed to charter this branch Oct. 13th at the Longfellow Hotel in Baltimore.**

**All interested manufacturing executives of this area are invited to attend. Communicate with Mr. Nils H. Lou, 3815 Glenmore Avenue, Baltimore for full details.**



## Dynamic Balance

(Continued from Page 17)

the inside of the extended flange provided as shown.

Wound armatures similar to the one shown at Fig. 6 are usually corrected by removing the top stick at the top of the winding slot and inserting in its place a metal formed slug, which may be extruded copper or hardened lead alloy. As this is usually done after varnishing and baking, the tendency is to fracture the varnish and insulation and is one of the slowest and most dangerous methods for correction as it introduces the possibility of shorts.

One electric motor manufacturer has developed a special top stick made of formed fibre made on an automatic machine. The top stick is shown in Fig. 15. This top stick provides a suitable open channel for insertion of graduated lengths of weights without disturbing the winding after baking and has proved very efficient and simple; weights may be added quickly which decrease the cost of balancing surprisingly.*

The obvious conclusion for the designer of new parts is of course to make every effort to provide some quick and simple method for correcting for unbalance on a part, selecting two planes for such correction as far apart as possible to make the weights added more effective. It is best always to select such planes as near the bearings of the part as possible. Naturally if the correction planes are too near the center of gravity, the amount of weight to be added to correct for a given unbalance will have to be

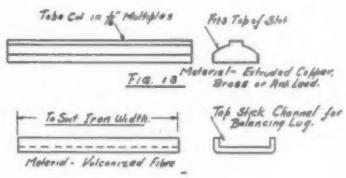


Figure 15

increased greatly due to the short leverage of the force. By keeping the correction planes farther apart, a much smaller weight may be used for correcting for a given unbalance, with the attendant lower cost.

* This manufacturer by this simple change has increased the number of armatures balanced per hour from twenty to sixty: a gain in production like this was well worth the initial investment in study and tooling.

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● Single Spindle, Double Spindle and Vertical Spindle, all newly designed to meet modern conditions. Illustration shows the No. 372-53″ Vertical Spindle Besly Grinder. Machines carrying grinding members 18″, 20″, 26″, 30″, 36″, 42″, 53″ and 72″ available in this new design. All have spindles much larger than heretofore. Improved exhaust arrangement. Radial Type Compensating Truing Device enabling operator to dress grinding member at any time. All employ Standard Totally Enclosed Fan Cooled Ball Bearing Motors mounted vertically with Multiple Vee Belt Drive. Infinite range of speeds possible. (No gearing—no special built-in motors.) ● This popular type Besly Grinder invaluable for grinding gear cases and covers, foundry flasks, bearing caps, boiler sections, stove and furnace doors, etc. ● Always equipped with the famous Besly Titan Steelbac Abrasive Discs—the original bolted-on type disc grinding member.

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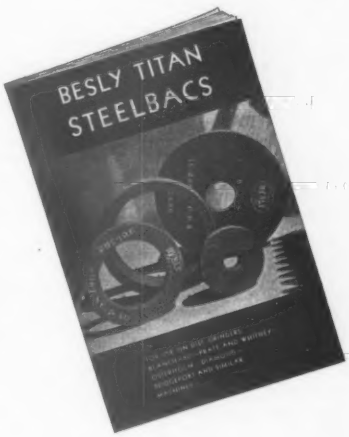


**WRITE FOR FURTHER PARTICULARS**


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## Milling

(Continued from Page 10)

70×26=1820 teeth per minute through the cut.

1820×.015 chip load per tooth = 27 in. per minute, table travel.

Since the part is 22 inches across it seems necessary to select a continuous milling machine of the rotary type for this job and space fixtures close to make total table travel per piece not over 25 inches.

25/27 of 60 seconds = 55 seconds per piece.

3600 seconds per hour divided by 55 is 65½ pieces per hour.

65½×75% to 80% machine efficiency = 49 to 52 pieces per hour.

---

Example of results with coarse tooth cutter. Same job, same conditions except cutter has 20 teeth.

70 R.P.M. × 20 = 1400 teeth per minute through the cut.

1400×.015=21 inches per minute table travel.

25/21 of 60 seconds is 70 seconds per piece.

3600 divided by 70 is 50 pieces per hour.

50×75% to 80% efficiency is 37 to 40 pieces per hour.

Note that the nature of this job (requiring shallow depth of cut) permits use of a fine tooth cutter, but if the job required ⅜ inch, or more depth of metal removal, chip disposal may require use of a coarse tooth cutter.

Also the surface speed selected (140 F. per minute) may require modification if the castings have large steel content.

It should be noted that quality of finish may be improved in some instances by use of a finer tooth cutter. The increased number of teeth through the cut provides smaller chip load resulting in better finish under the same feeds and speeds.

Present day high production requires efficient tooling and modern results cannot be obtained on obsolete machines. The machine must be of modern construction to obtain the necessary speeds and feeds to take advantage of modern cutting metals. Fixtures must be designed to stand the stress of high speed fast table operation to eliminate chatter.

Maximum efficiency and life of cutters are best obtained by maintaining a regular schedule of cutter grinding and not running the cutter until dullness causing burning and failure.

The old practice of using any old machine available and any cutter in stock of proper diameter contributes very little to the advancement of the science of tooling for mass production.

## Engineer's Place In A Changing World

(Continued from Page 40)

Those words are true! As individuels we may struggle, and succeed or fail; we may be rewarded beyond our deserts or miss a recognition that was richly our due. Whatever may happen, this at least we may hold to: that we lived in a glorious age, full of human possibilities; and that our daily work lay at the heart and center of that age.

As to our responsibilities, they are great. Perhaps the greatest of them lies in the understanding of the nature of the mechanisms and of the organizations on which depend the material interests of our generation. It is hard to say whether the greatest danger to hem dies in their being perverted and frustrated by powerful selfish interests, or in being overthrown by the recklessness and ignorance of our fellow citizens—even by those moved by the best of intentions. Our material blessings do not come naturally, as fruit grows on a tree. They come because thousands of individuals, having engineering and organizing skill, devote themselves in large and small capacities to keeping the machinery

(Continued on Page 57)

# Hydraulic Rigidmil Steps Up Production Mills 12 Accurate Locating Surfaces

Twelve locating surfaces on crankshaft forgings shown in Fig. 1 provide the basis for subsequent machining operations. These important surfaces are milled simultaneously from the solid to close limits

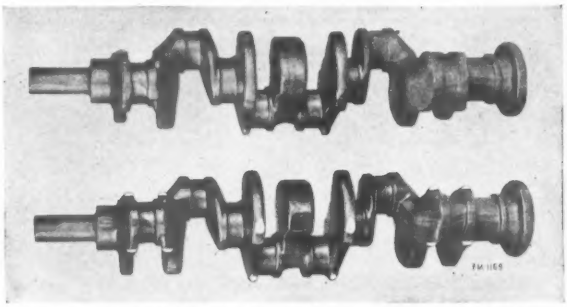


Fig. 1 — Crankshaft forgings before (upper) and after (lower) Rigidmilling 12 accurate locating surfaces.

by the Hydraulic Rigidmil shown in Fig. 2. Machine has special sliding head in which 2 vertical and 2 angular spindles carry a total of 6 cutters arranged as shown in Fig. 3. Unique design and fine workmanship in machine provide necessary high accuracy. Convenient reliable means for adjusting cutter spindles make it easy to maintain original accuracy through successive cutter sharpenings.

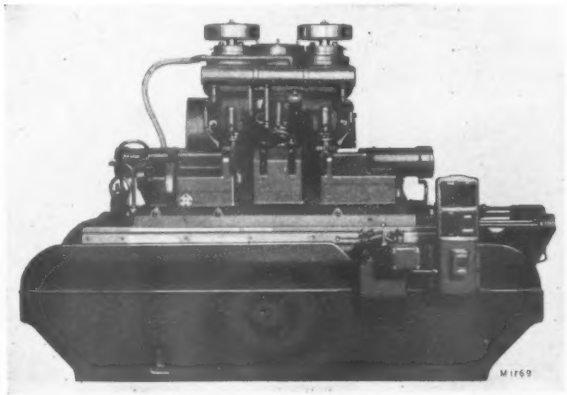


Fig. 2 — Hydraulic Rigidmil with automatic operating cycle and fixture for milling crankshafts. Sundstrand-designed and built throughout including hydraulic equipment.

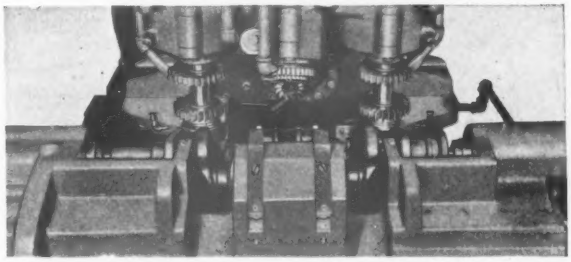


Fig. 3 — Showing cutter arrangment, and crankshaft forging in automatic hydraulic fixture.

Most interesting and effective in stepping up production are the hydraulically operated fixture and automatic machine-operating cycle. Operator places a center-drilled forging on rest-buttons in fixture and moves an operating lever. Fixture automatically positions and clamps the work-piece. Completion of these movements causes spindle-head automatically to rapid-approach and feed to depth against a positive stop. Table now goes through its dog-controlled cycle of: feed left—rapid right—feed right—rapid left—stop. Spindle-head then rapid traverses to rear and fixture automatically releases work-piece. Table feed can be varied infinitely between 1″ and 40″ a minute, rapid traverse is 250″ a minute. All hydraulic equipment is manufactured exclusively by Sundstrand.

Sundstrand Engineered Production Service, which created the Rigidmil illustrated, is at your disposal for increasing production and cutting costs on milling and turning operations. Investigate.


"MAIN STREET ... MY FOOT"
That's exactly what Bill Kaffrey said before he saw the book. Above you see Bill, comfortably seated at the general foreman's desk, reading rhymes about ... of all things ... lathes and getting a bookful of lathe "low-downs" that intrigued, surprized, fascinated Bill to ponder: "Why the---- hasn't someone talked about lathes like this before?" Bill may or may not have the final say about company purchases ... but he knows his lathes outside-in and inside-out. Even hard-boiled Bill admits that "What Makes Main Street," not only gave him a better conception of his job ... but an entirely new "lathe's-eye" view of his own particular niche in the parade of production.
"What Makes Main Street" ... isn't written for just the Bills of the production line. It's written for everybody from the boss to the apprentice. It's a shop book for shop-minded men who spell PROFIT—p-e-r-f-o-r-m-a-n-c-e. An interesting book ... a colorful book ... a downright valuable book. You get a copy, via the coupon, for a quarter of a dollar. It's
What makes Main Street?
d · Cincinnati, Ohio, U.S.A.

## Handy Andy's Workshop

(Continued from Page 26)

to take, one reason, perhaps, why it is not freely advanced. Personally, I like criticism, one reason being that I am highly critical of my own work, having never done a job or written an article that, somehow, didn't fall far short of what I would have liked it to be.

Criticism based on prejudice is futile; to withhold criticism because of personal liking is equally negative. As a concrete example, it has been the aim of the Society's officers, the publisher and the editorial committee to make "The Tool Engineer" the outstanding technical publication in its field; that we have succeeded to a degree is attested by the growing circulation, by the ever increasing demand for it. Doubtless, were we to charge subscription rates, its circulation would mount phenomenally. We have ample evidence of that.

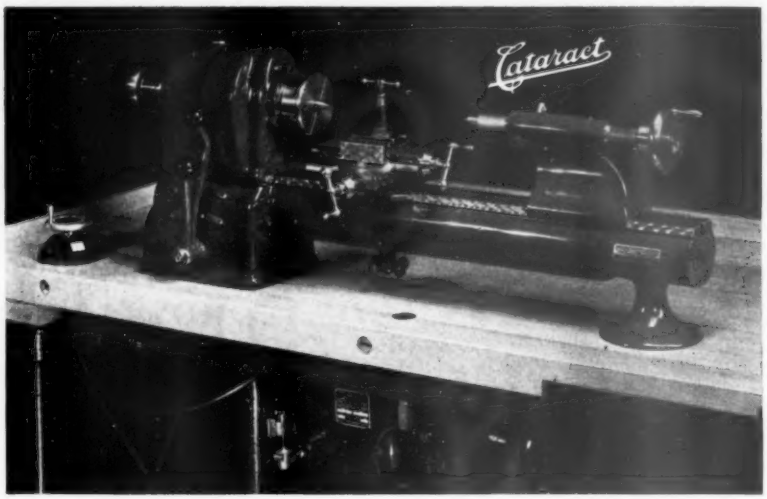
Many of the letters coming to hand are highly critical, yet support the axiom ot journalism that no publication can suit everyone. Some want humor, some cartoons, some gossip, others would have it entirely serious. As a compromise, we try to provide variety, interspersing human interest stuff with the technical matter that is really the meat of Tool Engineering. We do not attempt to please everyone; we couldn't if we would and we wouldn't if we could. It wouldn't be good journalism.

I have, before me, a letter from a valued friend, who points out that I have a caustic pen and a caustic tongue (on occasion) and I daresay that he is right. Yet, I seldom indulge in personalities; in speech and writing I attack conditions, sometimes with shafts so pointed that they penetrate the weaker props at which they are aimed and hit more solid substance. Hence, I am forever going over my writings to pull out the stingers, and if I don't, somebody else does. However, the limited space alloted to editorials makes incisiveness necessary, and, when all is said and done, a sharp tool cuts clean, leaves no lasting bruise. You either say something, briefly and decisively, or you use a lot of words and express — platitudes. Anyway, medicine good to give is good to take; in this game there are many players, with the lists open to all. Let's play the game.

H. A.

# This Month's Cover

HARDINGE BROTHERS, Inc., Elmira, New York, manufacturers of precision bench equipment, now use the New Departure Variable Speed Transitorq in an unusual manner. From the very beginning, bench lathes were provided with a means to change speeds immediately. Speed change was through countershafts, gear boxes and, later Hardinge applied the two-speed motor principle. The Hardinge original idea of a two-speed motor with transitorq variable speed drive incorporates new and retains old features for proper bench lathe operation—see five main features listed below.



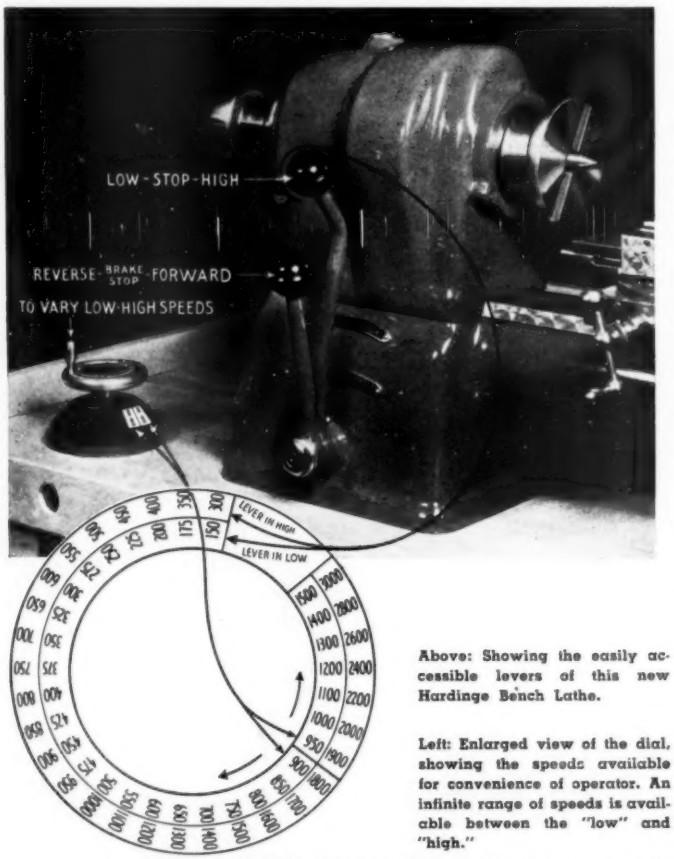

The Hardinge Transitorq Drive Unit has been in development and use for twenty months. During that time they have made tests, changes, and have worked with the New Departure Manufacturing Company in the development of a transitorq particularly adapted for bench lathe use. This is in keeping with their policy of having an approved unit before offering it to the trade. This bench lathe equipment involves experience since 1890. Spindle has Hardinge super-precision preloaded ball bearing spindle construction. Many hundreds of Hardinge preloaded ball bearing spindle machines are giving an excellent service as verified by repeat orders extending over a period of three years.

The transitorq has a range of 1 to 10 ratio between low and high speeds. The two-speed reversible motor has 1 to 2 ratio, giving the machine spindle a double speed range of 1 to 20 or 150 RPM and all intermediate speeds to 3000 RPM. This arrangement permits a desirable low and high speed range.

While the transitorq hand wheel gives speed variance from 150 to 3000 RPM—the Hardinge two-speed motor principle gives other advantages. With the transitorq hand wheel set for 1000 RPM, changing lever from LOW to HIGH position instantaneously changes speed to 2000 RPM or vice versa. In other words, there are two immediate speeds in every position of the transitorq. This speeds up production as it is not necessary to slowly turn hand wheel to get any LOW-HIGH or HIGH-LOW speed change.

The long lever gives LOW-STOP-HIGH speed change. The short lever gives FORWARD-BRAKE STOP-REVERSE speed change. Levers operate electrical motor controls. The short lever also applies a spindle brake. This lever control has been a Hardinge feature for years.

Hardinge modern design places transitorq and motor toward back of bench out of the way of the operator's knees. Hardinge mounting for transitorq and motor is completely rubber insulated against vibration. Provision is made for adjustment of belts. Offered in five sizes ½" to 1" collet capacity 7" or 9" swing.




**Above: Showing the easily accessible levers of this new Hardinge Bench Lathe.**

**Left: Enlarged view of the dial, showing the speeds available for convenience of operator. An infinite range of speeds is available between the "low" and "high."**

**Ask for bulletin T-E together with sixteen page bulletin showing useful attachments.**

# DOALL

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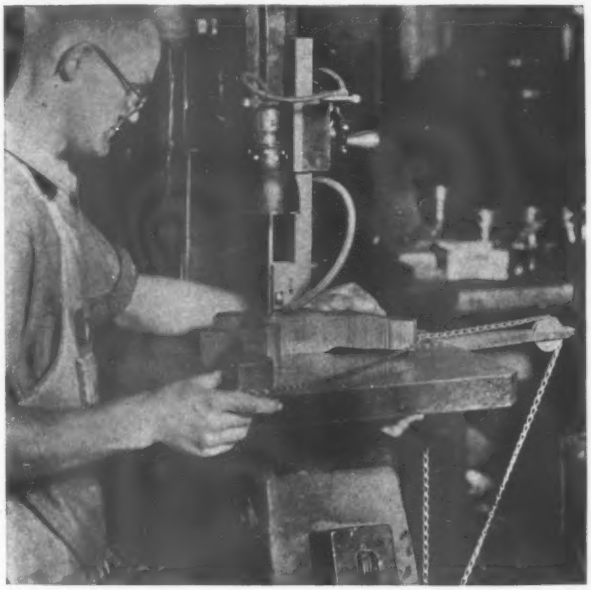

## Sawing Sample Forgings

**The Rockford Drop Forge Company prepare sample forgings by sawing them on their Doall Contour Machine. By this method they can quickly and inexpensively secure samples for testing and experiment. Intricate shapes and contours are easily handled with Doall's narrow precision saws and table tilt features.**

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Clean, precision cutting in material up to 8" thick provides practical methods of saving in many fields of metal working. Time savings of 50% to 75% are usual—allowing not only better production but overcoming the shortage of skilled labor. With DOALL, the ordinary mechanic has the output of an expert one.

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Combination sawing—filing—polishing in one machine: Inexpensive maintenance because of low cost of saw blades; sturdy precision construction assuring long life and heavy duty; Exclusive Doall features widening the scope of contour machining.

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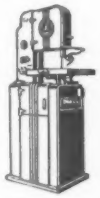

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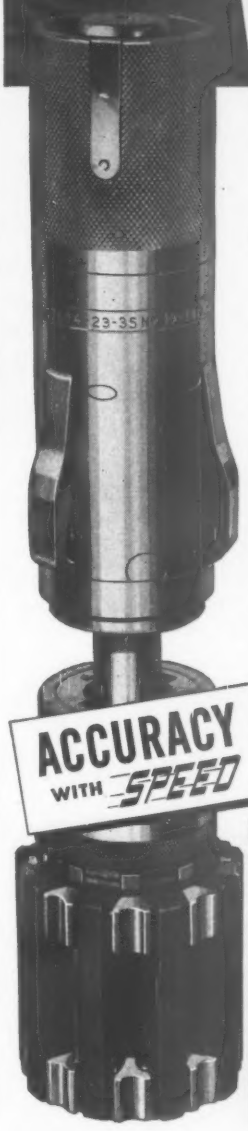


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**THESE bolts are manufactured in the same factory as the well-known "O. K. System of Inserted-Blade Metal Cutting Tools," and with the same relative care. They are forged of special medium carbon steel, heat treated for maximum toughness. The heads are milled accurately to size. With each bolt is furnished an O. K. nut of special design, in which nut and washer are incorporated into one unit. Having nut and washer integral eliminates time which is often wasted trying to keep tabs on separate washers. This flanged nut is made of the same tough steel as the bolt itself.**

**"O. K." Tee Slot Bolts may be obtained in any length, from 2" long to 24". A circular completely describing and pricing the line will be sent you on request.**

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12 Sizes
From ¾ to 10 ton Pressure

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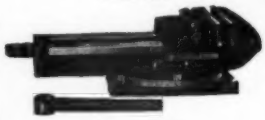

**Shaper Vises**
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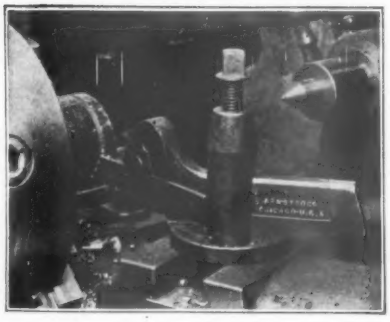
# ARMSTRONG

## are you Boondoggling in your Tool Room



The forging and grinding of bar tools is "made work" today for there are ARMSTRONG TOOL HOLDERS for every operation on lathes, planers, slotters and shapers — efficient multipurpose tools that permit productive work on a moment's notice. To hold back men or machines for "tool dressing," to stall for deliveries of tool steel, to keep cutting speeds down "to 1926 levels" is frankly "boondoggling" that cannot be supported by competitive industries.

Where the object is profit, tooling-up should be—that of the Armstrong System—to the selection of a cutter and adjusting it for clearance. Unproductive machine hours are strictly limited, for additional ARMSTRONG TOOL HOLDERS are as available as the nearest mill supply house. Cutting speeds with ARMSTRONG TOOL HOLDERS and ARMSTRONG HIGH SPEED Cutters have advanced far beyond the "150 ft. per minute" of days gone by.

To cut cutting costs and build profit adopt the Armstrong System as your tool system and "Save; All Forging, 70% Grinding, 90% High Speed Steel" on every operation—on short runs, on long runs; on the heaviest work, on the most delicate. Write for B-37 Catalog today.

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**360 N. Francisco Ave., Chicago, U.S.A.**
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**199 Lafayette St., New York, N.Y.**
**San Francisco London**

## Unique Hydraulic Control

(Continued from Page 15)

ment of the right-hand spindle of the machine. This was accomplished through the medium of a vertical cylinder connected to the quill containing this right-hand spindle. In figure 4 is shown the valve body containing trip plungers which are operated by dogs on the table. At the proper position of the table, these trip dogs operate on the trip plungers to raise and again to lower the spindle by hydraulic pressure. Both positions of the spindle are taken against positive stops and can be adjusted for cutter wear, maintaining exceedingly close accuracy of height of the bosses.

In order to obtain the production required, the customer purchased, in all, four of these machines. Each machine produced about 70 pieces per hour per operator, using a table traverse rate of approximately 78" per minute. The accuracy of reproduction was rather remarkable, tests indicating that the cutters were repeating the path without a variation exceeding about .002". One remarkable fact about the installation was

that the use of hydraulics permitted the very rapid acceleration and deceleration of the moving slide with absolutely no mechanical shock of any kind.

The equipment described above is one of the many examples of the application of hydraulic control to milling machine elements. This development, which is only in its infancy, offers great promise for the solution of many production problems not readily solved by ordinary methods.

### The Engineer in a Changing World

(Continued from Page 44)

of civilization in running order. It is an inescapable duty that we each make of ourselves centers of education and influence, to the end that our useful offices may continue, and our civilization fulfill its destiny of an ever-growing service to the needs of mankind.

### The Engineer's Responsibilities to the Public

I am going to suggest the nature of our responsibilities to the general public. We are now engaged in a strenuous race, a race between education and the breakdown of democratic government. As one of its major resulting catastrophies the breakdown of democratic government would destroy the engineer's usefulness to society and put an end to all reasonable hope for a continuation of our old progress toward a higher standard of living for the mass of our fellow citizens. To forestall this disaster, widespread education of the voting public is necessary. The first step in this process is our own self-education. Perhaps we never have stopped to think that we may be in need of that, that some of the ideas we have held since our youth may need revision.

We should examine our beliefs with all the critical capacity at our command. We should study and ponder with open minds proposals to which we have an instinctive aversion.

As engineers, it is incumbent upon us to distinguish between the device that flies in the face of nature and the device that makes a new application of natural law. I wish to stress our responsibility as an educational force counteracting the forces of social

dissolution. In our national meetings, in the meetings of our local sections, in our personal appearances before other bodies and groups, in our private conversations, in human contacts which we must learn to multiply and elaborate, in every way ingenuity can provide, with all the patience and wisdom at our command, we must speak and work for the continuance of an ordered society that moves forward to higher material possessions, more fruitful leisure, and deeper spiritual achievement.

In the Declaration of Independence our forefathers demanded for the individual the right to "life, liberty, and the pursuit of happiness." When those words were written it was a new idea in the world that happiness might be attained. The anciens and those of medieval times had other aspirations. They sought honor, liberty, and salvation, and were not sure that happiness was consistent with these or even possible on any terms. May I suggest that there is a deeper, richer word than "happiness," and that is the word, "satisfaction."

It is not too much to hope that we may attain satisfaction in the practice of our profession. In part it will come from the very fortunate fact that many of us as engineers see the idea in the mind finally embodied in the material machine, process, or structure, and actively serving the needs of mankind. But an even more powerful satisfaction will come to us if we see our profession in the aspects of history and of the evolving human drama. Fo rthose who see, and who act on the vision, the fullness of life is reserved. May that gift be ours!

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